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RCRA Permit Quality Protocol (Draft)

(U.S.) Environmental Protection Agency, Washington, DC

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16. Abstract (Limit: 200 words)

The primary purpose of the Permit Protocol is to assist permit writers in drafting or reviewing hazardous waste facility permits. The Protocol is to be used in conjunction with the model permit to evaluate the technical completeness and adequacy of permits. The Protocol provides a checklist of permit conditions, which mirrors the model permit conditions, for use in evaluating the completeness of the permit, and for a select number of permit conditions, the Protocol provides technical and enforceability evaluation criteria and guidance. IN addition, the Protocol is to be used to help evaluate the completeness and adequacy of the Administrative Recrod in supporting permit conditions. The Protocol is used by Headquarters when conducting Regional reviews, and Regions should use it when evaluating the States.

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Agency

Office of Solid Waste
and Emergency Response
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Office Of Solid Waste

EPA

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PB90 211004/AS

RCRA PERMIT QUALITY PROTOCOL

[DRAFT]

U.S. ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 1988

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RCRA PERMIT QUALITY PROTOCOL

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RCRA PERMIT QUALITY PROTOCOL SUPPORTING DOCUMENTATION

A. CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS A-1

I. INTRODUCTION

PURPOSE OF GUIDANCE. The purpose of the Protocol is to provide a format and guidance for evaluating the quality of EPA and State hazardous waste management facility permits, and supporting documentation or Administrative Records, issued under authority of Subtitle C of the Resource Conservation and Recovery Act of 1976 (RCRA), as amended. The Protocol is also designed to be used by Permit Writers in drafting, as well as reviewing, permits. It may also be used by Permit Writers in reviewing permit (Part B) applications.

The Protocol addresses the evaluation of permit quality in terms of: completeness/omissions; adequacy of the supporting documentation or Administrative Record; and for some permit conditions, technical soundness/defensibility, and enforceability. It does not provide detailed "how to" methodology for technical reviews. Instead, it merely indicates the types of considerations and factors that need to be addressed and provides references that describe the "how to" for technical reviews. Thus, it enables a determination of inadequacy if the pertinent factors are not addressed. But if they are addressed, it provides references that may be pursued in order to perform the necessary calculations, etc. to determine technical adequacy. In other words, the Protocol is useful in determining omissions and inadequacy but, for some permit conditions, further references may be needed to fully determine technical adequacy.

CONTENT OF GUIDANCE. The Protocol is divided into the following parts:

Part 1. Facility Background Information
Part 2. Administrative Record/Procedural Requirements
Part 3. Checklist of Permit Conditions
Part 4. Permit Condition Evaluation Guidance
Appendix A. Checklist for RCRA RD&D Permit Conditions.

RELATIONSHIP OF PERMIT QUALITY PROTOCOL TO MODEL PERMIT. The RCRA Permit Quality Protocol is meant to be used in conjunction with the Model RCRA Permit for Hazardous Waste Management Facilities for drafting and reviewing permits.

GENERAL INSTRUCTIONS. Effective use of the Protocol requires a working knowledge of RCRA and the RCRA regulations (40 CFR Parts 124, 260-266, 268, 270, and 271). Familiarity with Agency guidances and policies and knowledge of technical aspects is helpful but not necessary for at least completeness reviews.

The structure of the Protocol lends itself to a multi-level review of a permit. The reviewer can: 1) use Part 2 to review the Administrative Record for completeness and determine if the procedural requirements were followed; 2) use Part 3 to determine if the permit contains the required conditions (i.e., is complete); 3) use Part 4 to determine if the the permit conditions have inadequacies in terms of technical soundness and enforceability; and 4) use Part 4 to determine technical soundness by utilizing the references cited for guidance in how to do detailed technical reviews. Field testing of the Protocol has shown that use of the Part 3 checklist of permit conditions results in a rapid, preliminary indication of the quality of a permit. Also, the further the level of review of permits, the fewer the number of permits that can be reviewed in a given time-frame. This suggests different strategies to auditing permits, with a tradeoff in the number of permits that can be reviewed versus the depth of review.

Field testing of the Protocol showed that audit of a storage permit using only Parts 1 through 3 requires only a couple of hours, while auditing a land disposal permit in the same fashion requires four to five hours. Full audit of a storage permit (using Parts 1-4 without further reviews using the references listed in Part 4) requires about four hours. Full audit of a land disposal permit requires eight hours or more.

In auditing a number of permits, an effective use of the protocol might be to combine these two approaches. That is, Parts 1 through 3 of the Protocol are applied to all permits to be audited, with certain of those permits selected for more intense scrutiny utilizing the Part 4 evaluation guidance.

Following is a brief description of each part of the Protocol.

PART 1 - FACILITY BACKGROUND INFORMATION. This is simply a short form for recording general information on the facility and wastes handled. Most of this information can be obtained from: 1) the applicant's Part A application; 2) the General Facility Description in the applicant's Part B application; and 3) the Fact Sheet or Statement of Basis associated with the permit.

PART 2 - ADMINISTRATIVE RECORD/PROCEDURAL REQUIREMENTS. The Administrative Record is a very important part of permit development and defensibility since it is the official documentation explaining the basis of permit conditions and the only supporting evidence that EPA can use during appeals of permit decisions. This part of the Protocol discusses the content of the Administrative Record. It also discusses the procedural aspects of permitting (e.g., proper public notice and

comment review) that can be grounds for permit rejection if not properly followed. Finally, it provides a checklist for evaluating the completeness of the Administrative Record, including procedural aspects. [Note: States may have different rules governing permit procedures and the content and use of Administrative Records in supporting and defending their permits.]

PART 3 - CHECKLIST OF PERMIT CONDITIONS. This checklist of permit conditions mirrors the Model Permit conditions, and includes a citation to each condition in the Model. It is to be used to determine the completeness of a permit. If a required condition is not found in the permit, the reviewer may need to check the permit file or Administrative Record prior to recording that the condition is missing. An explanation must be provided for any requirement intentionally waived or deleted from the permit. Often, the explanation will be provided in the Fact Sheet.

In completing the checklist, it is suggested that the reviewer mark each item as: provided (denoted by Y), not provided (denoted as N), or as not applicable (denoted as NA); and indicate the location of the item in the permit.

PART 4 - PERMIT CONDITION EVALUATION GUIDANCE. This is a checklist, for a select number of permit conditions in the Model Permit, that gives guidance on how to evaluate the condition for technical soundness and enforceability by listing information and types of calculations that need to be included in the permit or Administrative Record. This part also lists references that may be pursued if a detailed technical review (e.g., a check on the approach or calculations) is desired. In the checklist, reference titles are abbreviated. A list of these references is also included in Part 4.

APPENDIX A - CHECKLIST FOR RCRA RD&D PERMIT CONDITIONS. Research, Development, and Demonstration Permits are issued under authority of the Hazardous and Solid Waste Amendments of 1984 (HSWA), Section 3005(g) of RCRA. This authority was codified in 40 CFR 270.65. This appendix has not been revised from the previous Protocol (August 1986).

RCRA PERMIT QUALITY PROTOCOL

PART 1. BACKGROUND INFORMATION

RCRA PERMIT QUALITY PROTOCOL
BACKGROUND INFORMATION

Facility Name: _____

Location: _____

EPA I.D. Number: _____

Owner/Operator: _____

Treatment/Storage/Disposal Units Addressed by Permit:

	Existing Unit	New Unit
___ Container Storage	___	___
___ Storage in Tanks	___	___
___ Treatment in Tanks	___	___
___ Waste Piles	___	___
___ Storage Surface Impoundments	___	___
___ Disposal Surface Impoundments	___	___
___ Landfills	___	___
___ Land Treatment Demonstration	___	___
___ Land Treatment Units	___	___
___ Incinerator (Short-term Operations)	___	___
___ Incinerator (Full Operations)	___	___
___ Other	___	___

Does the permit cover all treatment, storage and disposal units at the facility?

___ Yes ___ No

List the major wastes or types of wastes handled at the facility.

_____

_____

_____

_____

_____

Are wastes from off-site generators handled at the facility?

___ Yes ___ No

Are reactive or ignitable wastes handled at the facility?

___ Yes ___ No

RCRA PERMIT QUALITY PROTOCOL
BACKGROUND INFORMATION
- Continued -

Are incompatible wastes handled at the facility?

___ Yes ___ No

List the TSD units where reactive, ignitable or incompatible wastes are handled.

_____

_____

_____

_____

_____

If groundwater monitoring is required at the facility, do the data obtained during the interim status monitoring program show any evidence of groundwater contamination?

___ Yes ___ No ___ N.A.

Have there been identified at the facility any solid waste management units (SWMU) other than the hazardous waste management units covered in the permit?

___ Yes ___ No

Have any releases (or probable releases) been identified that require corrective action or that require additional studies to characterize?

___ Yes ___ No

Have any enforcement actions been taken against the owner/operator of the facility?

___ Yes ___ No ___ Enforcement files not reviewed

If yes, briefly describe.

_____

_____

_____

RCRA PERMIT QUALITY PROTOCOL
BACKGROUND INFORMATION
- Continued -

Type of permit: ___ Draft ___ Final

Issuing Agency: EPA Region _____ State _____ Joint _____

Reviewer: _____

Date: _____

RCRA PERMIT QUALITY PROTOCOL

PART 2. ADMINISTRATIVE RECORD/PROCEDURAL REQUIREMENTS

RCRA PERMIT QUALITY PROTOCOL
ADMINISTRATIVE RECORD/
PROCEDURAL REQUIREMENTS

1. INTRODUCTION

All permitting actions, including permit denials, must be based on an Administrative Record, which is the official document explaining the basis for the conditions in a permit or for the denial. The timing and content of Administrative Records are described below.

For a number of facilities, EPA and the States will be engaged in joint permitting activities, as a result of the Hazardous and Solid Waste Amendments of 1984. When a permit is issued jointly, EPA must establish an Administrative Record supporting the EPA portions of the permit. The general content of this Administrative Record is the same as when EPA is the sole permit-issuing authority. It is not necessary, however, for EPA to maintain an Administrative Record documenting the State portions of the permit. As a practical matter and for the benefit of the public, however, it is recommended that one combined Administrative Record be made available during the public comment period.

2. RATIONALE FOR ADMINISTRATIVE RECORDS

There are three reasons for establishing Administrative Records for RCRA permitting actions. First, EPA's regulations specify that permits shall be based on Administrative Records (40 CFR 124.6(e) and 124.9). Second, during the public comment period, the Administrative Record makes available to the public all information on which EPA based its decision to issue, deny, modify, or terminate a permit. Third, the Administrative Record is the only supporting evidence that EPA can bring to court during appeals of a permitting decision.

3. TIMING FOR ESTABLISHING ADMINISTRATIVE RECORDS

The Administrative Record should be started as soon as the permitting action is begun. For permits for existing facilities, the record should start with the 3010 Notification and/or Part A of the RCRA permit application. If an application is submitted voluntarily, the Administrative Record should be started as soon as the permit application is received.

For a permit termination or a permit revocation and reissuance, the Administrative Record is started as soon as the Agency decides to terminate or to revoke and reissue. Relevant information (e.g., citizen complaints) obtained or developed before this point in time must be included in the record. Note that documentation supporting a permit termination or revocation and reissuance can be placed either in a new Administrative Record created for the new permitting action or in the Administrative Record supporting the existing permit, in accordance with EPA Regional policy.

4. ADMINISTRATIVE RECORD LOGISTICS

The Administrative Record is a file containing all applicable information relevant to the permitting action. Because each EPA Regional Office has its own policies and procedures for establishing and maintaining files, the following guidelines contain the minimum recommended procedures for creating Administrative Records and describe the minimum recommended content. [For example, all incoming items may go to a central receiving person(s) who places the original in the record and sends copies to the Permit Writer and other appropriate persons; or each Permit Writer may be responsible for submitting incoming items in the record.]

a. Procedures

- Each Administrative Record should contain an index identifying each document in the record. The index serves a quality control function, as well as a record of the contents of the file. Each document in the record should be numbered or lettered sequentially. The index should include the document title, the document number/letter, the document location (which file volume), and the document date. The document dates should be identified consistently using either the typed date on the document, the date received, etc.

- Administrative Records should be placed in one central location. Access to these files must be controlled. For example, sign-out cards can be used to identify persons using the record. Permit Writers can maintain duplicate files at their desks for their own use. Note that placing the Administrative Record in a central file assures there is a complete file if Permit Writers change during the review/issuance process.

- The name of the treatment, storage, and disposal facility and the facility's EPA I.D. number should be placed on each file and document in the Administrative Record.

- Documents should be placed in the Administrative Record chronologically within each subject area (see Section 5 which has the checklist for suggested subject categories).

- A complete, integrated, current version of the Part B containing all revisions and supplements submitted by the applicant, including responses to Notices of Deficiencies, must be placed in the Administrative Record. It is preferred to have an integrated copy rather than the original Part B in the file followed by sets of revised pages. Old versions may be maintained in the Permit Writer's working files and should be noted as obsolete.

- Similarly, the current copy of the Part A must be placed in the Administrative Record. Old versions of the Part A may be kept in the Permit Writer's working files and noted as obsolete.

b. General Content of the Administrative Record

- A copy of all letters and pertinent memoranda, preferably showing concurrences, must be placed in the file. The yellow tissue copy, if used, is sufficient; make sure it is date stamped.

- All relevant correspondence received from the applicant must be placed in the file. The date of receipt by the Agency must be stamped on the correspondence.

- The Permit Writer should include notes from all internal permit-related meetings and telephone conversations resulting in decisions affecting the final permit.

- All correspondence, memoranda, telephone notes, or meeting notes which document agreements with the applicant and/or the basis for permit conditions must be in the record.

- Documents from State files (e.g., inspection reports) that were used during permit development must be in the record.

- Similarly, if a permit condition beyond RCRA has been established by the State agency, then the basis for it should be documented in the State file. For example, State-required ground-water monitoring parameters that are more stringent than RCRA parameters should be explained in the file.

- Calculations verifying information in the permit application should be included in the file. However, it is not necessary for the Permit Writer to place other working papers he has developed in the file unless those papers are the only documentation supporting a permit condition.

- References used during technical evaluation of the permit application and development of the permit should be identified in the file. Photocopies of relevant pages should be included in the file as well and organized in a way to facilitate cross-walking with the permit condition(s) they support.

5. SPECIFIC CONTENT OF THE ADMINISTRATIVE RECORD

On the following pages is a listing of the information that should be included in Administrative Records. All items may not be applicable for each permit. The listing consists of general items that apply to all permits and other sections that apply only to specific types of permits.

The Permit Writer should use this information as a checklist in helping to assure that Administrative Records are complete.

CHECKLIST TO INVENTORY ADMINISTRATIVE RECORDS/
PROCEDURAL REQUIREMENTS FOR RCRA PERMIT ACTIONS

GENERAL ITEMS FOR ALL PERMITS

___ Index

___ Notification Form 3010

___ Permit application

- ___ Part A
- ___ Complete, integrated, current version of the Part B containing all revisions and supplements submitted by the applicant, including responses to Notices of Deficiencies and any required certifications of compliance with RCRA requirements
- ___ Support data, technical reports, and all other attachments submitted by the applicant

___ Results of the Permit Writer(s) completeness and technical evaluation of the permit application

- ___ Completeness checklist(s)
- ___ Documentation that completeness deficiencies were addressed (e.g., additional completeness checklists)
- ___ Technical evaluation checklists
- ___ Documentation that additional technical concerns were addressed (e.g., additional technical evaluation checklists)
- ___ Notes and calculations (including technical exhibits)
- ___ Documentation that the Permit Writer reviewed and accepted completeness/technical review done by contractors or State Permit Writers
- ___ Other references

___ Inspection reports

- ___ Pre-permit site inspection report(s) to verify application information
- ___ Interim Status Standards inspection reports

___ State inspection reports that support the development of permit conditions

___ Correspondence

___ Part B call-in letter (yellow tissue copy)

___ Notices of Deficiencies (yellow tissue copies)

___ Other requests for additional information (yellow tissue copies)

___ Other correspondence from EPA (yellow tissue copies)

___ Correspondence from the applicant, including transmittal letters

___ Post Office return-receipt cards or certified mail receipts

___ Correspondence between EPA and the State

___ Correspondence with other EPA program offices

___ Enforcement
___ CERCLA
___ Water
___ Other

___ Correspondence with other Federal or State agencies (yellow tissue copies)

___ Internal notes and memoranda

___ Telephone conversation notes (handwritten or typed)
___ Meeting notes
___ Decision memoranda (e.g., denial of waiver request)

___ Where applicable, materials relating to determinations for conformance with other Acts (i.e., Coastal Zone Management Act, Clean Water Act, Fish and Wildlife Coordination Act, applicable State and local laws and regulations).

___ Consent decrees

___ Federal Register notice to grant or deny a delisting petition

___ Reviews of Exposure Information Reports (EIR)

___ Draft permit (or notice of intent to deny or to terminate)

___ Statement of basis or fact sheet and supporting documents

___ Documentation of public participation process

- ___ Public participation plan, if applicable
- ___ Public notice(s)
  - ___ Minimum of 45 days for public comment
  - ___ Minimum of 30 days notice of public hearing(s)
- ___ Notarized proof of publication of public notice(s) from each newspaper in which notice was placed and from each radio station which broadcast the notice
- ___ Comments received during public comment period and public hearing(s)
- ___ Tape or transcript of public hearing(s)
- ___ Summary of comments received

___ Response to comments received

- ___ Identification of draft permit provisions changed in the final permit in response to comments
- ___ Explanation of basis of changes
- ___ Brief description and response to significant comments with documents cited in response to comments (including new materials supplied during the public comment period and/or new materials added by the Permit Writer)

___ Final permit

___ Documentation of review and approval of the permit by Regional Counsel

INCINERATOR PERMITS

___ Trial burn plan (should be in Part B)

___ Trial burn results

___ Review of trial burn results by the Permit Writer or documentation that the Permit Writer reviewed and accepted reviews performed by contractors or State Permit Writers

___ Correspondence between EPA and the State regarding establishment of incineration permit conditions

___ Documentation supporting permit conditions established by the State (e.g., POHCs)

GROUND-WATER MONITORING REPORTS

___ Ground-water characterization report(s)

___ Site characterization report(s)

___ Comprehensive ground-water monitoring evaluation report or other site inspection report(s)

HSWA CORRECTIVE ACTION

___ Solid waste management unit (SWMU) information request (yellow tissue copy)

___ Applicant's SWMU response report

___ RCRA Facility Assessment (RFA) conducted by the Permit Writer or by a contractor

- ___ Preliminary Review
- ___ Visual Site Inspection Report
- ___ Sampling Plan
- ___ Final RFA
- ___ Documentation that the Permit Writer reviewed and accepted a contractor's RFA

___ RFI Work Plan with Permit Writer approval documents

___ Final RCRA Facility Investigation (RFI) Report with Permit Writer approval documents

___ RCRA Section 3008(h) orders

___ CERCLA administrative orders

___ Documentation of CERCLA activities at the site

- ___ Copy of CERCLA file or
- ___ Review of periodic reports on on-going work

___ Corrective measures study plan and Permit Writer approval documents

___ Corrective measures study report and Permit Writer approval documents

___ Periodic progress reports

VARIANCES/WAIVERS

[Note: For each variance or waiver granted or denied, the Administrative Record must document that the Permit Writer reviewed and accepted or rejected the permit applicant's demonstration, including any additional items used in the decision.]

___ Demonstration that security requirements are not necessary [40 CFR 264.14(a)]

___ Demonstration that washout of existing surface impoundments, waste piles, landfill, and land treatment units by a 100-year flood will not cause adverse effects on human health or the environment [40 CFR 264.18(b)(1)(ii)]

___ Demonstration that communications or emergency equipment is not required [40 CFR 264.32]

___ Demonstration that aisle space is not required [40 CFR 264.35]

___ Demonstration that additional time is needed for closure activities [40 CFR 264.113]

___ Demonstration that an adjusted level of liability coverage is warranted [40 CFR 264.147(c) and (d)]

___ Demonstration that surface impoundment single liner requirement is not necessary [40 CFR 264.221(b)]

___ Demonstration that surface impoundment double liner/leachate collection system is not necessary [40 CFR 264.221(d)]

___ Waiver from surface impoundment double liner/leachate collection requirement for certain monofills [40 CFR 264.221(e)]

___ Demonstration that waste pile liner/leachate collection system is not necessary [40 CFR 264.251(b)]

___ Demonstration that landfill multiple liner/leachate collection system is not necessary [40 CFR 264.301(d)]

___ Waiver from landfill liner/leachate collection requirements for certain monofills [40 CFR 264.301(e)]

___ Exemption from all requirements for incinerators (except waste analysis and closure) or some requirements because of the type of hazardous waste handled [40 CFR 264.340(b) or (c)]

___ Demonstration there is good cause for shortening the new incinerator shakedown phase to less than 720 hours or for granting an extension beyond 720 hours [40 CFR 264.344(c)(1) and 270.62(a)]

___ Demonstration that shortening the post-closure care period will still protect human health and the environment or that extending the post-closure care period from 30 years is necessary to protect human health and the environment [40 CFR 264.117(a)]

___ Demonstration that basis for exemptions from ground-water monitoring requirements under 40 CFR 264.90(b) or 264.90(c) are satisfied

___ Demonstration that alternate concentration limits (ACLs) will not pose a substantial present or potential hazard to human health or the environment [40 CFR 264.94(b)]

___ Documentation for granting an extension from the effective date of the land disposal ban [40 CFR 268.5]

___ Documentation for granting an exemption from the landfill disposal ban [40 CFR 268.6]

MAJOR PERMIT MODIFICATIONS/REVOCATION AND REISSUANCE

___ Original permit

___ Draft revised permit

___ Statement of basis or fact sheet

___ New or updated permit application, if requested by EPA

___ Additional information requested by EPA

___ Correspondence

  ___ Permit application update call-in (yellow tissue copy)

  ___ Request for additional information (yellow tissue copy)

  ___ Other relevant correspondence

___ Documentation/explanation of basis of permit modification

  ___ Citation of appropriate provisions of 40 CFR 270.41

___ Permittee request for, or agreement to, revocation and reissuance for reasons cited in 40 CFR 270.41(a)

___ Public notice

___ Minimum of 45 days for public comment

___ Minimum of 30 days notice for public hearing(s)

___ For modifications involving selection of remedies for corrective action, all documents supporting the original permitting action

MINOR PERMIT MODIFICATIONS

___ Documentation of reasons for minor modification(s)

___ Documentation of Permittee's consent to minor modification(s)

Reviewer: _____

Date: _____

RCRA PERMIT QUALITY PROTOCOL

PART 3. PERMIT CHECKLIST/CONDITIONS

Following is a checklist of permit conditions to facilitate completeness reviews of Permits.

Facility Name _____

ID No. _____

RCRA PERMIT CHECKLIST/CONDITIONS

I. GENERAL PERMIT CONDITIONS

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Effect of Permit [§§270.4 and 270.30(g)]	I.A.		
Permit Actions [§§270.30(b) and (f) and 270.4(a)]	I.B.(1,2)		
Severability [§124.16(a)]	I.C.		
Definitions	I.D.		
Duties and Requirements	I.E.		
Duty to comply [§270.30(a)]	I.E.1		
Duty to reapply [§§270.30(b) and 270.10(h)]	I.E.2		
Permit expiration [§270.51]	I.E.3		
Need to halt or reduce activity not a defense [§270.30(c)]	I.E.4		
Duty to mitigate [§270.30(d)]	I.E.5		
Proper operation and maintenance [§270.30(e)]	I.E.6		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Duty to provide information [§§270.30(h) and 264.74(a)]	I.E.7		
Inspection and entry [§270.30(i)]	I.E.8(a,b,c,d)		
Monitoring and records [§§270.30(j) and 264.74(b)	I.E.9(a,b,c)		
Reporting planned changes [§270.30(l)(1)]	I.E.10		
Reporting anticipated noncompliance [§270.30(l)(2)]	I.E.11		
Certification of construction or modification [§270.30(l)(2)]	I.E.12(a,b)		
Transfer of permits [§§270.30(l)(3), 264.12(c)]	I.E.13		
Twenty-four hour reporting [§270.30(l)(6)]	I.E.14(a,b,c)		
Other noncompliance [§270.30(l)(10)]	I.E.15		
Other information [§270.30(l)(11)]	I.E.16		
Signatory Requirement [§§270.11 and 270.30(k)]	I.F.		
Reports, Notifications, and Submissions to the Regional Administrator	I.G.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Confidential Information [§270.12]	I.H.		
Documents to be Submitted Prior to Operation [§§270.32 and 270.33]	I.I.		
Documents to be Maintained at Facility Site	I.J		
Waste analysis plan [§264.13(b)]	I.J.1		
Inspection schedule(s) [§264.15(b)]	I.J.2		
Personnel training documents/records [§264.16(d)]	I.J.3		
Contingency plan [§264.53(a)]	I.J.4		
Operating record [§264.73]	I.J.5		
Closure plan [§264.112(a)]	I.J.6		
Post-closure plan [§264.118(a)]	I.J.7		
Annually adjusted closure cost estimate/ post-closure cost estimate [§§264.142(d) and 264.144(d)]	I.J.8		
Other documents	I.J.9		

Facility Name _____
ID No. _____

RCRA PERMIT CHECKLIST/CONDITIONS

II. GENERAL FACILITY CONDITIONS

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Design and Operation of Facility [§264.31]	II.A.		
Required Notices [§264.12]	II.B.(1,2)		
General Waste Analysis [§264.13]	II.C.		
Security [§264.14]	II.D.		
General Inspection Requirements [§264.15]	II.E.		
Personnel Training [§264.16]	II.F.		
Special Provisions for Ignitable, Reactive, or Incompatible Waste [§264.17]	II.G.		
Location Standards [§264.18(a)]	II.H.		
Preparedness and Prevention	II.I.		
Required equipment [§264.32]	II.I.1		
Testing and maintenance of equipment [§264.33]	II.I.2		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Access to communication or alarm system [§264.34]	II.I.3		
Required aisle space [§264.35]	II.I.4		
Arrangements with local authorities [§264.37]	II.I.5		
Contingency Plan	II.J.		
Implementation of plan [§264.51]	II.J.1		
Copies of plan [§264.53]	II.J.2		
Amendments to plan [§264.54]	II.J.3		
Emergency Coordinator [§264.55]	II.J.4		
Manifest System [§§264.71 and 264.72]	II.K.		
Recordkeeping and Reporting	II.L.		
Operating record [§264.73]	II.L.1		
Biennial report §§264.75]	II.L.2		
General Closure Requirements	II.M.		
Performance standard [§264.111]	II.M.1		
Amendment to closure plan [§264.112(c)]	II.M.2		
Notification of closure [§264.112(d)]	II.M.3		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Time allowed for closure [§264.113]	II.M.4		
Disposal or decontamination of equipment, structures, and soils [§264.114]	II.M.5		
Certification of closure [§264.115]	II.M.6		
Survey plat [§264.116]	II.M.7		
General Post-Closure Requirements	II.N.		
Post-closure care period [§264.117(a)(1)]	II.N.1		
Post-closure security [§264.117(b)]	II.N.2		
Amendment to post-closure plan [§264.118(d)]	II.N.3		
Post-closure notices [§264.119]	II.N.4(a,b,c)		
Certification of completion of post-closure care [§264.120]	II.N.5		
Cost Estimate for Facility Closure [and Post-Closure] [§§264.142 and 264.144]	II.O.(1,2,3,4)		
Financial Assurance for Facility Closure [and Post-Closure] [§§264.143 and 264.145]	II.P.		
Liability Requirements [§264.147]	II.Q.		
Incapacity of Owners or Operators, Guarantors, or Financial Institutions [§264.148]	II.R.		

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III. CONTAINERS

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	III.A.		
Permitted and Prohibited Waste Identification	III.B.		
Allowable wastes for storage in containers	III.B.1		
Prohibition from storing wastes not identified in Condition III.B.1	III.B.2		
Condition of Containers [§264.171]	III.C.		
Compatibility of Waste with Containers [§264.172]	III.D.		
Management of Containers [§264.173]	III.E.		
Containment Systems [§264.175]	III.F.		
Inspection Schedules and Procedures [§264.174]	III.G.		
Recordkeeping [§264.73]	III.H.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Closure [§264.178]	III.I.		
Special Container Provisions for Ignitable or Reactive Wastes [§264.176]	III.J.(1,2)		
Special Container Provisions for Incompatible Wastes [§264.177]	III.K.(1,2,3)		
Compliance Schedule	III.L.		

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IV. **TANKS**

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	IV.A.		
Permitted and Prohibited Waste Indentification	IV.B.		
Allowable wastes for storage and/or treatment in each tank	IV.B.1		
Prohibition from storing or treating wastes not identified in Condition IV.B.1	IV.B.2		
Secondary Containment and Integrity Assessments	IV.C.		
Existing tank system integrity assessment [§264.191]	IV.C.1		
Design, construction, and operating plans for tank systems maintaining a variance from the requirements for secondary containment [§264.193]	IV.C.2		
Design, construction, and operating plans for secondary containment system [§264.193(b-f)]	IV.C.3		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Requirements for existing tank systems pending installation of secondary containment [§264.193(i)]	IV.C.4		
a. Leak test for non-enterable underground tanks	IV.C.4(a)		
b. Leak test for other than non-enterable underground tanks	IV.C.4(b)		
c. Leak test for ancillary equipment	IV.C.4(c)		
d. Response to leaks or spills	IV.C.4(d)		
Operating Requirements	IV.D.		
Placing wastes in tanks that could cause failure [§264.194(a)]	IV.D.1		
Prevention of spills and overflows [§264.194(b)]	IV.D.2		
Response to Leaks and Spills [§264.196(a-f)]	IV.E.		
Stop hazardous waste flow	IV.E.1		
Remove waste and accumulated precipitation	IV.E.2		
Contain visible releases	IV.E.3		
Close tank system or:	IV.E.4		
a. Remove waste and repair tank system	IV.E.4(a)		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
b. Repair primary system	IV.E.4(b)		
c. Provide secondary containment for underground components requiring repair	IV.E.4(c)		
d. Repair above-ground portions	IV.E.4(d)		
e. Provide secondary containment for components not readily available for visual inspection	IV.E.4(e)		
f. New components must conform to regulatory requirements	IV.E.4(f)		
Certification of major repairs	IV.E.5		
Inspection Schedules and Procedures	IV.F.		
Conduct inspections according to the approved schedule	IV.F.1		
Periodic inspection of overfill controls [§264.195(a)]	IV.F.2		
Daily inspection requirements [§264.195(b)]	IV.F.3		
1. Above-ground portions of the tank system	IV.F.3(a)		
2. Data gathered from monitoring and leak detection equipment	IV.F.3(b)		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
3. Construction materials and the area immediately surrounding the externally accessible portion of the tank systems including the secondary containment system	IV.F.3(c)		
Cathodic protection system [§264.195(c)]	IV.F.4		
Document compliance with the operating record [§264.195(d)]	IV.F.5		
Recordkeeping and Reporting	IV.G.		
Report leak or spill within 24 hours [§264.196(d)(1) or (2)]	IV.G.1		
Release report [§264.196(d)(3)]	IV.G.2 (a,b,c,d,e)		
Certification of major repairs [§264.196(f)]	IV.G.3		
Certification for new tank systems [§264.196(g)]	IV.G.4		
Tank integrity assessment [§264.191(a)]	IV.G.5		
Leak tests and integrity tests [§264.193(i)]	IV.G.6		
Clean Closure and/or Closure with Post-Closure Care [§264.197]	IV.H.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Clean closure (without post-closure care requirements) [§264.197(a)]	IV.H.1		
Closure with waste in place (with post-closure care requirements) [§264.197(b) and (c)]	IV.H.2		
Special Tank Provisions for Ignitable or Reactive Wastes	IV.I.		
Management plan [§264.198(a)]	IV.I.1		
Maintenance of protective distances [§264.198(b)]	IV.I.2		
Special Tank Provisions for Incompatible Wastes	IV.J.		
Required precautions [§264.199(a)]	IV.J.1		
Decontamination of tanks which previously stored incompatible wastes or materials [§264.199(b)]	IV.J.2		
Compliance Schedule	IV.K.		

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V. SURFACE IMPOUNDMENTS

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	V.A.		
Permitted and Prohibited Waste Identification	V.B.		
Allowable wastes for storage, treatment, or disposal in surface impoundments	V.B.1		
Prohibition from storing, treating, or disposing wastes not identified in Condition V.B.1	V.B.2		
Design, Construction, and Operating Requirements	V.C.		
Liners and leachate collection systems [§264.221(c)]	V.C.1		
General design, construction and operating practices [§264.221(d)]	V.C.2		
Monofill design, construction and operating practices [§264.221(e)]	V.C.3		
Prevention of overtopping [§264.221(f)]	V.C.4		

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V. SURFACE IMPOUNDMENTS

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	V.A.		
Permitted and Prohibited Waste Identification	V.B.		
Allowable wastes for storage, treatment, or disposal in surface impoundments	V.B.1		
Prohibition from storing, treating, or disposing wastes not identified in Condition V.B.1	V.B.2		
Design, Construction, and Operating Requirements	V.C.		
Liners and leachate collection systems [§264.221(c)]	V.C.1		
General design, construction and operating practices [§264.221(d)]	V.C.2		
Monofill design, construction and operating practices [§264.221(e)]	V.C.3		
Prevention of overtopping [§264.221(f)]	V.C.4		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Dike design, construction and operating practices [§264.221(g)]	V.C.5		
Leak Control Procedures	V.D.		
Leak detection system monitoring	V.D.1		
Removal from service [§264.227(a)-(b)]	V.D.2		
Recertification of repaired surface impoundments [§264.227(d)]	V.D.3(a,b)		
Closure of nonrepaired surface impoundments [§264.227(e)]	V.D.4		
Inspection Schedules and Procedures	V.E.		
Inspection schedule	V.E.1		
During construction [§264.226(a)]	V.E.2		
Prior to start-up [§264.226(a)]	V.E.3(a,b)		
Prior to re-start [§264.226(c)]	V.E.4(a,b)		
Recordkeeping and Reporting [§264.227(b)(6)]	V.F.		
Closure and Post-Closure Care	V.G.		
Clean closure (without post-closure care requirements) [§264.228(a)]	V.G.1		
Closure with waste in place (with post-closure care requirements) (storage and treatment impoundments) [§264.228(b)-(c)]	V.G.2		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Closure with waste in place (with post-closure care requirements) (disposal impoundments) [§264.228(b)]	V.G.3		
Surface Impoundment Retrofitting Plans or Waiver Application Requirements	V.H.		
Retrofitting plans	V.H.1 (a,b,c,d,e)		
Waiver application plans	V.H.2		
Permit modification request	V.H.3		
Special Surface Impoundment Provisions for Ignitable or Reactive Wastes [§264.229(b)]	V.I.		
Special Surface Impoundment Provisions for Incompatible Wastes [§264.230]	V.J.		
Special Surface Impoundment Provisions for Hazardous Wastes F020, F021, F022, F023, F026 and F027 [§264.231]	V.K.		
Special Surface Impoundment Provisions for Hazardous Wastes Restricted from Surface Impoundment Units [§§268.5 and 268.7]	V.L.(1,2,3,4, 5,6,7,8)		
Compliance Schedule	V.M.		

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VI. WASTE PILES

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	VI.A.		
Permitted and Prohibited Waste Identification	VI.B.		
Allowable wastes for storage or treatment in waste piles	VI.B.1		
Prohibition from storing or treating wastes not identified in Condition VI.B.1	VI.B.2		
Design, Construction, and Operating Requirements	VI.C.		
Liners [§264.251(a)(1)]	VI.C.1		
Leachate control [§264.251(a)(2)]	VI.C.2		
Run-on control [§264.251(c)]	VI.C.3		
Run-off management [§264.251(d)]	VI.C.4		
Run-on/run-off collection [§264.251(e)]	VI.C.5		
Dust suppression [§264.251(f)]	VI.C.6		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Inspection Schedules and Procedures	VI.D.		
During and after construction [§264.254(a)]	VI.D.1		
During operations and after storms [§264.254(b)]	VI.D.2		
Recordkeeping [§264.73]	VI.E.		
Clean Closure and Post-Closure Care	VI.F.		
Clean closure (without post-closure care requirements) [§264.258(a)]	VI.F.1		
Closure with waste in place (with post-closure care requirements) [§264.258(b) and (c)]	VI.F.2		
Groundwater, Surface Water, and Subsurface Soil Monitoring Exemptions [§§264.250(c) and 264.251(b)]	VI.G.(1,2)		
Special Waste Pile Provisions for Ignitable or Reactive Waste [§264.198(a)]	VI.H.		
Special Waste Pile Provisions for Incompatible Wastes [§§264.257 and 264.17(b)]	VI.I.(1,2,3)		
Special Waste Pile Provisions for Hazardous Waste F020, F021, F022, F023, F026 and F027 [§264.259]	VI.J		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Special Waste Pile Provisions for Hazardous Wastes Restricted from Waste Pile Units [§§268.5, 268.7]	VI.K.(1,2,3,4, 5,6,7)		
Compliance Schedule	VI.L.		

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VII(A). LAND TREATMENT OPERATIONS

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	VII(A).A.		
Permitted and Prohibited Waste Identification	VII(A).B.		
Allowable wastes for treatment in the land treatment program	VII(A).B.1		
Prohibition from treating wastes not identified in Condition VII(A).B.1.	VII(A).B.2		
Treatment Program [§264.271(a)]	VII(A).C.		
Design, Construction, and Operating Requirements	VII(A).D.		
Basic design requirements to enhance waste degradation [§264.273(a)]	VII(A).D.1		
Run-off minimization [§264.273(b)]	VII(A).D.2		
Run-on control [§264.273(c)]	VII(A).D.3		
Run-off management [§264.273(d)]	VII(A).D.4		
Run-on/run-off collection [§264.273(e)]	VII(A).D.5		
Dust suppression [§264.273(f)]	VII(A).D.6		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Unsaturated Zone Sampling and Monitoring [§264.278]	VII(A).E.(1,2,3,4,5,6,7,8)		
Inspection Schedules and Procedures [§264.273(g)]	VII(A).F.		
Periodic inspection of run-on/run-off control	VII(A).F.1		
Periodic inspection of dust suppression control	VII(A).F.2		
Recordkeeping and Reporting [§264.279]	VII(A).G.		
Closure and Post-Closure Care	VII(A).H.		
Closure procedures [§264.280]	VII(A).H.1(a,b,c,d,e,f,g,h)		
Closure certification	VII(A).H.2		
Post-closure care procedures	VII(A).H.3		
Special Requirements for Food-Chain Crop Protection [§264.276]	VII(A).I.		
Food-chain protection in the untreated surroundings	VII(A).I.1(a,b,c,d,e)		
Prevention of crop growth in the treatment zone	VII(A).I.2		
Special Land Treatment Provisions for Ignitable or Reactive Wastes [§264.281]	VII(A).J.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Special Land Treatment Provisions for Incompatible Wastes [§264.17(b)]	VII(A).K.		
Special Land Treatment Provisions for Hazardous Wastes F020, F021, F022, F023, F026 and F027 [§264.283]	VII(A).L.		
Special Land Treatment Provisions for Hazardous Wastes Restricted from Land Treatment Units [§§268.5 and 268.7]	VII(A).M.(1,2, 3,4,5)		
Compliance Schedule	VII(A).N.		

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VII(B). LAND TREATMENT DEMONSTRATIONS

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	VII(B).A.		
Permitted and Prohibited Waste Identification	VII(B).B.		
Allowable wastes for a land treatment demonstration	VII(B).B.1		
Prohibition from treating wastes not identified in Condition VII(B).B.1	VII(B).B.2		
Duration of Demonstrations	VII(B).C.		
Land Treatment Demonstration Requirements [§264.272]	VII(B).D.		
Demonstrations Test and Analytical Procedures	VII(B).E.		
Recordkeeping and Reporting	VII(B).F.(1,2, 3)		

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VIII. LANDFILLS

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	VIII.A.		
Permitted and Prohibited Waste Identification	VIII.B.		
Allowable wastes for disposal in a landfill or landfill cell	VIII.B.1		
Prohibition from disposing wastes not identified in Condition VIII.B.1	VIII.B.2		
Design, Construction, and Operating Requirements	VIII.C.		
Liners and leachate collection systems [§264.301(c)]	VIII.C.1		
Leachate collection tank management	VIII.C.2		
General design, construction and operating practices [§264.301(d)]	VIII.C.3		
Monofill design, construction and operating practices [§264.301(e)]	VIII.C.4		
Run-on control [§264.301(f)]	VIII.C.5		
Run-off management [§264.301(g)]	VIII.C.6		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Run-on/run-off collection tank management [§264.301(h)]	VIII.C.7		
Dust suppression [§264.301(i)]	VIII.C.8		
Inspection Schedules and Procedures	VIII.D.		
During construction [§264.303(a)]	VIII.D.1		
Prior to start-up [§264.303(a)]	VIII.D.2(a,b)		
During operations and after storms [§264.303(b)]	VIII.D.3		
Cell Location Surveying [§§264.73 and 264.309]	VIII.E.		
Closure and Post-Closure Care	VIII.F.		
Closure care [§264.310(a)]	VIII.F.1		
Post-closure care [§264.310(b)]	VIII.F.2		
Special Landfill Provisions for Ignitable or Reactive Wastes [§264.312]	VIII.G.(1,2)		
Special Landfill Provisions for Incompatible Wastes [§§264.217(b) and 264.17]	VIII.H.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Special Landfill Provisions for Hazardous Wastes F020, F021, F022, F023, F026, and [§264.317]	VIII.I.		
Special Landfill Provisions for Hazardous Wastes Restricted from Landfill Units [§§268.5 and 268.7]	VIII.J.(1,2,3,4,5,6,7)		
Special Landfill Provisions for Liquid Waste [§264.314]	VIII.K.(1,2,3)		
Volume Reduction Requirements for Empty Containers [§264.315]	VIII.L.		
Provisions for the Containerized Landfill Disposal of Lab Packs [§264.316]	VIII.M.		
Compliance Schedule	VIII.N.		

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IX(A). INCINERATION

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	IX(A).A.		
Identification Criteria for Permitted and Prohibited Waste [§264.344(a)]	IX(A).B.		
For commercial (off-site) incineration	IX(A).B.1		
For non-commercial (on-site) incineration	IX(A).B.2		
Verification of waste composition	IX(A).B.3		
Construction, Instrumentation, and Operational Performance Requirements [§§264.343 and 264.345]	IX(A).C.		
Construction and maintenance per approved plans and specifications (new facilities)	IX(A).C.1		
Maintenance per approved plans and specifications (existing facilities)	IX(A).C.2		
Instrumentation per approved plans and specifications	IX(A).C.3		
POHC DRE requirement	IX(A).C.4		
Maximum HCl allowable	IX(A).C.5		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Maximum particulate matter allowable	IX(A).C.6		
Maximum CO allowable	IX(A).C.7		
Maximum waste feed rate allowable	IX(A).C.8		
Minimum combustion temperature	IX(A).C.9		
Maximum combustion gas velocity	IX(A).C.10		
Maximum mass feed rates of toxic metals	IX(A).C.11		
Minimum atomization fluid pressure	IX(A).C.12		
Maximum burner turndown ratio	IX(A).C.13		
Minimum $\frac{L}{G}$ ratio to the absorber	IX(A).C.14		
Minimum scrubber effluent pH	IX(A).C.15		
Minimum scrubber water nozzle pressure	IX(A).C.16		
Minimum pressure drop allowable across venturi scrubber	IX(A).C.17		
Minimum scrubber blowdown rate	IX(A).C.18		
Minimum kVA for electrostatic precipitator operation	IX(A).C.19		
Minimum kV for ionized wet scrubber	IX(A).C.20		
Minimum and maximum pressure drop across the baghouse	IX(A).C.21		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Fugitive emissions control	IX(A).C.22		
Compliance with operating conditions	IX(A).C.23		
Inspection Requirements	IX(A).D.		
Incinerator and associated equipment [§264.347(b)]	IX(A).D.1		
Instrumentation	IX(A).D.2		
Periodic testing of emergency equipment [§264.347(c)]	IX(A).D.3		
Monitoring Requirements [§264.347(a)]	IX(A).E		
Listed or tabulated routine requirements	IX(A).E.1		
Additional special requirements	IX(A).E.2		
Waste Feed Cut-Off and Incinerator Shut-Off Requirements	IX(A).F		
Listed or tabulated requirements for automatic waste feed cut-off and incinerator shut-off [§264.345(e)]	IX(A).F.1		
Provisions for manual waste feed cut-off and incinerator shut-off	IX(A).F.2		
Closure [§264.351]	IX(A).G.		
Recordkeeping	IX(A).H		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Monitoring and inspection data [§264.347(d)]	IX(A).H.1		
Waste feed shut-offs	IX(A).H.2		
Compliance Schedule	IX(A).I		

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IX(B). SHORT-TERM TEST INCINERATION

	Model Permit Condition ID	Actual Permit Condition ID	Comments
MODULE HIGHLIGHTS	IX(B).A.		
SHAKEDOWN PHASE	IX(B).B.		
Duration of Shakedown Phase [§264.344(c)(1)]	IX(B).B.1		
Allowable Waste Feed	IX(B).B.2		
Instrumentation and Operational Performance Requirements [§§264.343 and 264.345]	IX(B).B.3.		
Maximum CO allowable	IX(B).B.3.a.		
Minimum combustion temperature	IX(B).B.3.b.		
Maximum combustion gas velocity	IX(B).B.3.c.		
Minimum atomization fluid pressure	IX(B).B.3.d.		
Maximum burner turndown ratio	IX(B).B.3.e.		
Minimum L/G ratio to the absorber	IX(B).B.3.f.		
Minimum scrubber effluent pH	IX(B).B.3.g.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Minimum scrubber water nozzle pressure	IX(B).B.3.h.		
Minimum pressure drop allowable across venturi scrubber	IX(B).B.3.i.		
Minimum scrubber blowdown rate	IX(B).B.3.j.		
Minimum kVA for electrostatic precipitator operation	IX(B).B.3.k.		
Minimum kV for ionized wet scrubber	IX(B).B.3.l.		
Minimum and maximum pressure drop across the baghouse	IX(B).B.3.m.		
Fugitive emissions control	IX(B).B.3.n.		
Compliance with operating conditions	IX(B).B.3.o.		
Inspection Requirements	IX(B).B.4.		
Incinerator and associated equipment [§264.347(b)]	IX(B).B.4.a.		
Instrumentation	IX(B).B.4.b.		
Periodic testing of emergency equipment [§264.347(c)]	IX(B).B.4.c.		
Monitoring Requirements [§264.347(a)]	IX(B).B.5.		
Listed or tabulated routine requirements	IX(B).B.5.a.		
Additional special requirements	IX(B).B.5.b.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Waste Feed Cut-Off and Incinerator Shut-Off Requirements	IX(B).B.6.		
Listed or tabulated requirements for automatic waste feed cut-off and incinerator shut-off [§264.345(e)]	IX(B).B.6.a.		
Provisions for manual waste feed cut-off and incinerator shut-off	IX(B).B.6.b.		
Recordkeeping	IX(B).B.7.		
Monitoring and inspection data [§264.347(d)]	IX(B).B.7.a.		
Waste feed shut-offs	IX(B).B.7.b.		
Compliance Schedule	IX(B).B.8.		
TRIAL BURN PHASE [§270.62(b)]	IX(B).C.		
Conformity to Trial Burn Plan	IX(B).C.1		
Trial POHCs	IX(B).C.2		
Trial Burn Determinations	IX(B).C.3		
Trial Burn Data Submissions and Certifications	IX(B).C.4		
POST-TRIAL BURN PHASE	IX(B).D.		
Allowable Waste Feed	IX(B).D.1		
Instrumentation and Operational Performance Requirements [§§264.343 and 264.345]	IX(B).D.2.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Maximum CO allowable	IX(B).D.2.a.		
Minimum combustion temperature	IX(B).D.2.b.		
Maximum combustion gas velocity	IX(B).D.2.c.		
Minimum atomization fluid pressure	IX(B).D.2.d.		
Maximum burner turndown ratio	IX(B).D.2.e.		
Minimum G ratio to the absorber	IX(B).D.2.f.		
Minimum scrubber effluent pH	IX(B).D.2.g.		
Minimum scrubber water nozzle pressure	IX(B).D.2.h.		
Minimum pressure drop allowable across venturi scrubber	IX(B).D.2.i.		
Minimum scrubber blowdown rate	IX(B).D.2.j.		
Minimum kVA for electrostatic precipitator operation	IX(B).D.2.k.		
Minimum kV for ionized wet scrubber	IX(B).D.2.l.		
Minimum and maximum pressure drop across the baghouse	IX(B).D.2.m.		
Fugitive emissions control	IX(B).D.2.n.		
Compliance with operating conditions	IX(B).D.2.o.		
Inspection Requirements	IX(B).D.3.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Incinerator and associated equipment [§264.347(b)]	IX(B).D.3.a.		
Instrumentation	IX(B).D.3.b.		
Periodic testing of emergency equipment [§264.347(c)]	IX(B).D.3.c.		
Monitoring Requirements [§264.347(a)]	IX(B).D.4.		
Listed or tabulated routine requirements	IX(B).D.4.a.		
Additional special requirements	IX(B).D.4.b.		
Waste Feed Cut-Off and Incinerator Shut-Off Requirements	IX(B).D.5.		
Listed or tabulated requirements for automatic waste feed cut-off and incinerator shut-off	IX(B).D.5.a.		
Provisions for manual waste feed cut-off and incinerator shut-off	IX(B).D.5.b.		
Recordkeeping	IX(B).D.6.		
Monitoring and inspection data	IX(B).D.6.a.		
Waste feed shut-offs	IX(B).D.6.b.		
Compliance Schedule	IX(B).D.7.		
REPORTING NON-COMPLIANCE DURING THE TRIAL BURN	IX(B).E.		

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X. GROUND-WATER DETECTION MONITORING

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	X.A		
Well Location, Installation and Construction	X.B.		
Monitoring well locations (to include proposed monitoring wells) [§264.97(a) and (b)]	X.B.1		
Description of monitoring wells [§264.97(a) and (c)]	X.B.2		
Methodology for monitoring well abandonment	X.B.3		
Indicator Parameters and Monitoring Constituents	X.C.		
Indicator parameters and monitoring constituents to be monitored [§264.98(a)]	X.C.1		
Plan for establishing ground-water quality data [§264.97(g)]	X.C.2(a,b)		
Sampling and Analysis Procedures	X.D.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Techniques for sample collection [§§264.97(d)(1) and 264.97(e)]	X.D.1		
Sample preservation and shipment [§§264.97(d)(2) and 264.97(e)]	X.D.2		
Analytical procedures [§§264.97(d)(3) and 264.97(e)]	X.D.3		
Chain of custody [§264.97(d)(4)]	X.D.4		
Elevation of the Ground-Water Surface	X.E.		
Determination of ground-water surface elevation [§264.97(f)]	X.E.1		
Report of monitoring well elevation	X.E.2		
Statistical Procedures	X.F		
Statistical procedure [§264.97(h)(1)]	X.F.1		
Alternate statistical procedure [§264.97(h)(2)]	X.F.2		
Monitoring Program and Data Evaluation	X.G.		
Sampling procedures	X.G.1		
Sampling frequency [§264.98(d)]	X.G.2		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Determination of ground-water flow rate and direction [§264.98(e)]	X.G.3		
Statistical evaluation of sample analysis [§264.98(g)]	X.G.4		
Time requirement for statistical determination [§264.98(g)(2)]	X.G.5		
Recordkeeping and Reporting	X.H.		
Recordkeeping of all ground-water monitoring data [§264.73(b)(6)]	X.H.1		
Submittal of background values	X.H.2		
Report schedule for analytical and statistical results	X.H.3		
Reporting significant increases in background levels for regulated units [§264.98(h)	X.H.4 (a,b,c,d,e)		
Reporting significant increases in background levels for non-regulated units [§264.98(i)]	X.H.5(a,b,c,d)		
Assurance of Compliance [§264.98(k)]	X.I.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Special Requirements if Significant Increases Occur in Values for Parameters or Constituents	X.J.		
Requirements if a significant increase occurs [§264.98(h) and/or §264.98(i)]	X.J.(1,2,3,4,5)		
Request for Permit Modification [§264.98(j)]	X.K		

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RCRA PERMIT CHECKLIST/CONDITIONS

XI. GROUND-WATER COMPLIANCE MONITORING

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	XI.A.		
Well Location, Installation and Construction	XI.B.		
Monitoring well locations (to include proposed monitoring wells) [§264.99(b)]	XI.B.1		
Description of monitoring wells [§264.99(b)]	XI.B.2		
Methodology for monitoring well abandonment	XI.B.3		
Ground-Water Protection Standard	XI.C.		
Hazardous constituents and concentration limits to be monitored [§§264.93 and 264.94]	XI.C.1		
Background concentrations established during each sampling event [§264.99(c)(1)]	XI.C.2		
Designation of monitoring wells for compliance monitoring [§264.95]	XI.C.3		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Length of the compliance period [§264.96]	XI.C.4		
Sampling and Analysis Procedures	XI.D.		
Techniques for sample collection [§§264.97(d)(1) and 264.97(e)]	XI.D.1		
Sample preservation and shipment [§§264.97(d)(2) and 264.97(e)]	XI.D.2		
Analytical procedures [§§264.97(d)(2) and 264.97(e)]	XI.D.3		
Chain of custody [§264.97(d)(4)]	XI.D.4		
Quarterly sampling [§264.99(d)]	XI.D.5		
Annual analysis of Appendix IX constituents [§264.99(f)]	XI.D.6		
Elevation of the Ground-Water Surface	XI.E.		
Determination of ground-water surface elevation [§264.97(f)]	XI.E.1		
Report of monitoring well elevation	XI.E.2		
Statistical Procedures [§§264.99(c)(2)(i) and (ii)]	XI.F.		
Monitoring Program and Data Evaluation	XI.G.		
Sampling procedures	XI.G.1		
Sampling frequency [§264.99(d)]	XI.G.2		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Determination of ground-water flow rate and direction [§264.99(e)]	XI.G.3		
Appendix IX sample analysis [§264.99(f)]	XI.G.4		
Statistical evaluation of sample analysis [§264.99(h)(1) and (2)]	XI.G.5		
Time requirements for statistical determination [§264.99(h)(2)]	XI.G.6		
Recordkeeping and Reporting	XI.H.		
Recordkeeping of all ground-water monitoring data [§264.73(b)(6)]	XI.H.1		
Report schedule for analytical and statistical results [§264.99(h)(2)]	XI.H.2		
Reporting statistically significant increases [§264.99(i)(1)]	XI.H.3		
Reporting concentrations of Appendix IX constituents not routinely monitored	XI.H.4		
Assurance of Compliance [§264.99(k)(1)]	XI.I.		
Special Requirements if the Ground-Water Protection Standard is Exceeded	XI.J.		
Requirements if a significant increase occurs [§264.99(i) and/or 264.99(j)]	XI.J.(1,2,3,4)		
Request for Permit Modification	XI.K.		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Establish a corrective action program [§264.99(i)(2)]	XI.K.1		
Modify compliance monitoring program [§264.99(k)]	XI.K.2		

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RCRA PERMIT CHECKLIST/CONDITIONS

XII(A). CORRECTIVE ACTION PROGRAM FOR REGULATED UNITS

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	XII(A).A.		
Well Location, Installation and Construction	XII(A).B.		
Monitoring well locations [§264.100(a)(3) and (d)]	XII(A).B.1		
Description of monitoring wells [§264.100(d)]	XII(A).B.2		
Methodology for monitoring well abandonment	XII(A).B.3		
Ground-Water Protection Standard	XII(A).C.		
Hazardous constituents and concentration limits in the facility ground-water protection standard [§264.100(d)]	XII(A).C.1		
Designation of monitoring wells for corrective action monitoring [§§264.95 and 264.100(d)]	XII(A).C.2		

	Model Permit Condition ID	Actual Permit Condition ID	45 Comments
Hazardous constituents to be monitored [§264.93]	XII(A).C.3		
Corrective Action Program	XII(A).D.		
Beginning date of corrective action [§264.100(c)]	XII(A).D.1		
Prevent constituents from exceeding concentration limits [§264.100(b)]	XII(A).D.2		
Remove or treat constituents exceeding concentration limits [§264.100(ʏ)]	XII(A).D.3		
Continuation of corrective action [§264.100(f)]	XII(A).D.4		
Sampling and Analysis Procedures	XII(A).E.		
Techniques for sample collection [§264.97(d) and (e)]	XII(A).E.1		
Preservation and shipment of samples [§264.97(d) and (e)]	XII(A).E.2		
Analytical procedures [§264.97(d) and (e)]	XII(A).E.3		
Chain of custody [§264.97(d) and (e)]	XII(A).E.4		
Ground-Water Surface Elevation	XII(A).F.		
Determination of the ground-water surface elevation [§264.97(f)]	XII(A).F.1		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Report elevation of monitoring well(s)	XII(A).F.2		
Statistical Procedures	XII(A).G.		
Monitoring Program and Data Evaluation	XII(A).H.		
Sampling procedures	XII(A).H.1		
Sampling frequency [§264.100(d)]	XII(A).H.2		
Sample analysis procedures	XII(A).H.3		
Determination of ground-water flow rate [§264.98(e)]	XII(A).H.4		
Statistical comparison of hazardous constituents with concentration limits	XII(A).H.5		
Recordkeeping and Reporting	XII(A).I.		
Recordkeeping of ground-water monitoring data [§264.73(b)(6)]	XII(A).I.1		
Semi-annual report of corrective action program effectiveness [§264.100(g)]	XII(A).I.2		
Report schedule for analytical and statistical results [§§264.99(f) and (h)(2)]	XII(A).I.3		
Request for Permit Modification [§264.100(h)]	XII(A).J.		

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RCRA PERMIT CHECKLIST/CONDITIONS

XII(B). CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS

Model Permit Condition ID	Actual Permit Condition ID	Comments

[This Checklist is currently being revised and will be distributed when redrafted.]

Facility Name _____

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RCRA PERMIT CHECKLIST/CONDITIONS

XIII. POST-CLOSURE CARE

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Module Highlights	XIII.A.		
Unit Identification	XIII.B.		
Post-Closure Procedures and Use of Property	XIII.C.		
Post-Closure care time period (normally 30 yrs.) [§264.117(a)]	XIII.C.1		
Ground-water monitoring requirements [§264.117(a)(1)]	XIII.C.2		
Surface impoundment requirements [§§264.228(b)(1) and (3)]	XIII.C.3(a,b)		
Land treatment requirements [§264.280(c)]	XIII.C.4(a,b, c,d,e,f,g)		
Landfill requirements [§264.310(b)]	XIII.C.5(a,b, c,d,e)		
Continuation of security procedures [§264.117(b)]	XIII.C.6		
Restriction on disturbing units [§264.117(c)]	XIII.C.7		

	Model Permit Condition ID	Actual Permit Condition ID	Comments
Implementation of Post-Closure Plan [§§264.117(d) and 264.118(b)]	XIII.C.8		
Inspections	XIII.D.		
Notices and Certification	XIII.E.		
Submission of record to local authority and the Agency [§264.119(a)]	XIII.E.1		
Notation on facility property deed [§264.119(a)]	XIII.E.2(a,b)		
Procedures for removing hazardous waste in the future [§264.119(c)]	XIII.E.3		
Submission of certification following post-closure care period [§264.120]	XIII.E.4		
Financial Assurance	XIII.F.		
Maintenance of financial assurance during post-closure period [§264.145]	XIII.F.1		
Demonstration of financial assurance value [§264.145(a)(10)]	XIII.F.2		
Submission of bills for reimbursement [§264.145(a)(11)]	XIII.F.3		
Post-Closure Permit Modifications	XIII.G.		

RCRA PERMIT QUALITY PROTOCOL

PART 4. PERMIT QUALITY EVALUATION CRITERIA

Following is a compilation of selected permit conditions and a description of how to evaluate their content in terms of completeness, technical soundness, and enforceability. This is not a "cookbook." Instead, it merely identifies the type of analyses that need to be done and includes references that describe how to do the analyses. The references are listed by code. These codes are described at the end of this Part.

EVALUATION CRITERIA

Condition I.I.: Documents to be Submitted Prior to Operation

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
When appropriate, the permit must specify the documents to be submitted prior to operation of the facility and the schedule for submitting the documents (40 CFR 270.33).	When appropriate, the permit must specify the documents to be submitted prior to operation of the facility or of specific units that demonstrate compliance with RCRA. Such documents may include as-built plans, chemical and physical characterization of wastes, etc. The permit also must establish a schedule for submission of each document. ENFORCEABILITY The permit condition(s) must clearly state the documents to be submitted, and must specify a date for each submittal.		

EVALUATION CRITERIA

Condition II.E.: General Inspection Requirements

[General inspection schedule]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The general inspection schedule attached to the permit identifies the general facility items to be inspected, the problems for which these items are to be inspected, and the frequency of inspections (40 CFR 264.15).	The general inspection schedule must include the following items, as applicable: o monitoring equipment o safety and emergency equipment o security devices o operating/structural equipment o loading/unloading areas The schedule must identify specific problems to be looked for during the inspection of each item and a specific frequency for inspecting each item. For example, an inspection frequency of "daily" is appropriate, while a frequency of "as used" is inappropriate because it defeats the inspection objective of preventative detection of hazards. The permit also must specify the specific remedies to be implemented when inspections disclose problems.		

EVALUATION CRITERIA

Condition II.E.: General Inspection Requirements

[General inspection schedule (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The permit must specify that the permittee conduct inspections in accordance with the inspection schedule. It also must specify that the permittee record these inspections in a log which is available for examination by agency personnel.		

Condition II.E.: General Inspection Requirements

[For underground tank systems, until secondary containment in provided]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
For other than non-enterable underground tanks, where leak tests will not be conducted, the inspection schedule attached to the permit must specify the procedures to be followed for periodically emptying and inspecting the interior of tanks [40 CFR 264.193 (i)].	The inspection schedule for the tanks must include a procedure for emptying them periodically and inspecting their interiors for cracks, leaks, corrosion or erosion, or wall thinning. The procedure must identify how each tank will be emptied, where the waste will be temporarily stored, and how each tank will be cleaned and vented to prepare it for inspection. The procedure also must describe the equipment to be used during the inspection, the items to be inspected, and the problems for which each item is to be inspected.	PWGD-HW Tanks pp. 8-7, 8-10	

EVALUATION CRITERIA

Condition II.E.: General Inspection Requirements

[For underground tank systems, until secondary containment in provided (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	In addition, the procedure must address protection of the personnel inspecting the tank interiors, including testing of air quality, adequate lighting, appropriate protective clothing, and standby equipment and services. ENFORCEABILITY The permit will require the permittee to inspect the tank interiors in accordance with these procedures and to record the inspection results in a log, which is available for examination by agency personnel.		

Condition II.E.: General Inspection Requirements

[For surface impoundments]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The inspection schedule attached to the permit must describe the procedures for inspecting surface impoundments	In addition to the four items specified in section 264.226(b), the inspection schedule must include procedures to inspect soil layers protecting synthetic liners from sunlight, wind, and machinery used to remove sludge from the impoundment.	PAGM-GFS	

EVALUATION CRITERIA

Condition II.E.: General Inspection Requirements

[For surface impoundments (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
overtopping controls, content levels, leak detection systems, and dikes [40 CFR 264.226 (b)].	The inspection schedule must include a procedure for inspecting each of the items in 40 CFR 264.226(b). In particular, the procedure for thoroughly inspecting the impoundment dikes must be described. It must include checking for the following: o cracks and erosion o settlement, depressions, or sink holes o evidence of movement o seepage and damp areas o animal burrows, trees, and brush growth o spillway obstruction or deterioration ENFORCEABILITY The permit will require the permittee to inspect the surface impoundments in accordance with this procedure and to document the inspection results in a log, which is available for examination by the agency.	PAGM pp. 5-42, 5-43	

EVALUATION CRITERIA

Condition II.H.: Location Standards

[Flood proofing descriptions/drawings]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
If the facility is located within a 100-year floodplain, the permit must specify flood protection or a flood plan per 40 CFR 270.14(b)(11)(iii) and 264.18(b). (The criteria on this page are for review of flood protection. The criteria for flood plan review follows.)	The administrative record must contain the necessary documentation supporting the design of devices to protect the facility from washout during a 100-year recurrence interval flood. The source of 100-year flood data must be stipulated. This data must be obtained from the Federal Emergency Management Agency (FEMA), the Federal Insurance Administration (FIA), a flood Insurance Study (FIS) or from equivalent analytical and mapping procedures. The record may include an engineering report and drawings for the design of flood protection devices. An engineering analysis of the various hydrodynamic and hydrostatic forces resulting from a 100-year flood must be provided. The design of the flood protection devices must provide engineering information demonstrating that these devices will prevent facility washout from the 100-year flood. In addition, the record must contain documentation showing that the agency conducted a technical review of the flood protection devices.	PAGM-GFS pp. 5-142 and 5-143 PWGM-CLAEAR pp. 2-12 to 2-18 pp. 3-5 to 3-8 PWGM pp. 4-5	

EVALUATION CRITERIA

Condition II.H.: Location Standards

[Flood proofing descriptions/drawings (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The permit must require certification by a professional engineer that flood protection devices are constructed as designed per 40 CFR 270.30(k)(2). In addition, the permit must require that records be maintained of all inspections and repairs or corrective actions for the life of the facility.		

Condition II.H.: Location Standards

[Flood plan]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
If the facility is located within a 100-year floodplain, the permit must specify flood protection or a flood plan per 40 CFR 270.14(b)(11)(iv) and 264.18(b). The criteria on this page are for review of a flood plan.	The administrative record must contain the necessary documentation supporting a facility flood plan per 40 CFR 270.14(b)(11)(iv)(c). A flood plan consists of formulated procedures to safely remove hazardous wastes from a flood prone facility, before flood waters can reach the facility, and ship it to a facility eligible to receive hazardous waste at a location that is not vulnerable to flood waters.	PAGM-GFS pp. 5-142 & 5-143 PWGM-CLAEAR pp. 2-12 to 2-18 pp. 3-5 to 3-8	

EVALUATION CRITERIA

Condition II.H.: Location Standards

[Flood plan (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The plan must specify a schedule of activities required to move the hazardous wastes. The schedule must include the time allowed for each activity. Timing of activities is to be based on relative flood levels. The plan must also describe the equipment and personnel to be used to move hazardous wastes. The plan must also describe the location the wastes will be moved to and demonstrate that those facilities are eligible to receive hazardous wastes. ENFORCEABILITY These conditions are enforceable through the agency's enforcement inspection program.		

Condition II.J.: Contingency Plan

[Unit-specific control procedures for tanks and surface impoundments]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The contingency plan attached to the permit must contain specific procedures for responding to leaking tanks [40	The contingency plan must contain specific procedures for responding to leaking tanks [40 CFR 264.196(a)-(f)] and surface impoundments failures [40 CFR 264.227(a) and (b)] and must address the requirements necessary to remedy a failure [40 CFR		

EVALUATION CRITERIA

Condition II.J.: Contingency Plan

[Unit-specific control procedures for tanks and surface impoundments (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
CFR 264.194(c)] and sudden drops in the contents of a surface impoundment [40 CFR 264.227(c)].	264.15(c)]. Also, 40 CFR Part 302 may require the permittee to notify the National Response Center of certain releases from tanks. The tank procedures must address the following: o Stopping of waste addition to the tank; o Removal of wastes from the tank system and secondary containment system; o Containment of visible releases to the environment; o Notifications and reports; and o Certification of major repairs. The procedures for removal of leaked or spilled waste, must address the disposition of waste removed from the tanks and secondary containment system. A general procedure for assessing the nature and extent of tank damage and determining the appropriate repair mechanism must be included.	STHWT Chapter 11	

EVALUATION CRITERIA

Condition II.J.: Contingency Plan

[Unit-specific control procedures for tanks and surface impoundments (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The surface impoundment procedures must address the following: o Stopping waste addition to the impoundment; o Containing leakage; o Stopping the leak; o Preventing catastrophic failure; o Emptying the impoundment if the leak cannot be stopped; and o Notifications.		
	The procedures for emptying the impoundment must address the rate of liquid removal and temporary storage of the impoundment's contents. Note that the recommended rate of liquid removal is one foot per day to prevent dike failure.	PAGM pp. 5-48 to 5-50	

EVALUATION CRITERIA

Condition II.J.: Contingency Plan

[Unit-specific control procedures for tanks and surface impoundments (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The permit will require the permittee to maintain the Contingency Plan on-site and to implement its procedures when necessary. The permittee is also required to file a report with the Regional Administrator when the Contingency Plan must be implemented.		

EVALUATION CRITERIA

Condition III.F.: Construction and Maintenance of Containment Systems

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The plans and specifications attached to the permit must demonstrate compliance with the requirements for a containment system as required by 40 CFR 264.175. They must specifically describe and/or show via design drawings:	The design information must specify the construction material for the base of the storage area (usually concrete or lined). It must be sufficiently impervious to contain spills, leaks or precipitation. For existing storage areas, a pre-permitting inspection must confirm that all cracks, gaps and construction joints are properly sealed. The design information for new storage areas must specify that construction joints will be sealed.	PWGD-Containers pp. 4-14 to 4-16	
o the base of liner material o containment system capacity o design features for drainage of leaks and spills o prevention of run-on	The containment system must have sufficient capacity to contain 10 percent of the volume of containers, or the volume of the largest container, whichever is greater [40 CFR 264.175(b)(3)]. Containers that do not contain free liquids need not be considered. The permit application must contain calculations demonstrating the required capacity. The administrative record must contain documentation that the calculations were checked during technical evaluation of the application. If containers are not elevated on pallets or other device, the design information must specify a sloped base or other design features so that leaks, spills and precipitation will drain off (usually to a collection sump). The procedures for and timing of removal of liquids from the collection sump must be specified in the attachment to the permit.	PWGD-Containers pp. 4-12 to 4-15	

EVALUATION CRITERIA

Condition III.F.: Construction and Maintenance of Containment Systems (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	This generally will include a procedure for determining if the accumulated liquid is hazardous.		
	The design plans and specifications must show that the containment system is elevated above grade or describe protection from run-on (by a wall or other feature). If no protection from run-on is shown, the containment system must have sufficient extra capacity to also contain run-on. That is, water must not be allowed to flow into, through and then out of the storage area. If the facility does not have a roof with sufficient overhang or sides to prevent accumulation of precipitation then additional secondary containment for rainfall from a 24-hour, 25-year storm event must be provided.	PWGD-Containers pp. 4-16 to 4-17	
	ENFORCEABILITY		
	In the case of a new container storage area, the permit must contain a condition requiring that an engineer certify that the facility was constructed in accordance with the design plans and specifications, and that the certification be submitted to the agency at the completion of construction.		

EVALUATION CRITERIA

Condition A.: Special Provisions for Incompatible Wastes

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCESFINDINGS/COMMENTS
Where incompatible wastes are handled, the permit must include special design and operating features to prevent incompatible materials from comingling (see 40 CFR 264.177).	The administrative record must document that, during technical evaluation of the permit application, the permit writer either determined waste incompatibilities or verified the applicant's assessment of waste incompatibilities. When determining if incompatibilities exist, the applicant must not only look at the hazardous wastes themselves, but also must consider any materials stored nearby. Each container area must provide secondary containment for the containers stored in that area. The most common method of meeting the requirements of 40 CFR 264.177 is the division of the container storage area into two or more cells separated by a wall, curb or other device. This must be shown clearly on the design drawings, with the cells labeled to show the specific wastes to be placed in each cell. Where there is no design feature (e.g. wall, curb) to separate areas containing incompatible wastes, a permit condition specifying that containers holding incompatible wastes be placed in overpacked drums is an option to consider for the permit.	PWDG-Containers pp. 4-11 to 4-12

EVALUATION CRITERIA

Condition III.K.: Special Provisions for Incompatible Wastes (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The permit also must contain a conditions specifying that a hazardous waste cannot be placed in an unwashed container previously holding an incompatible waste or material.		
	ENFORCEABILITY		
	These conditions are generally enforced through certification of construction by a registered engineer and continued inspection of the facility by the agency.		

EVALUATION CRITERIA

Condition IV.C.3.: Design and Construction of the Secondary Containment System

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify how the secondary containment system has been (or will be) designed, installed, and operated to prevent any migration of waste or accumulated liquid from the tank system to the soil, ground water, or surface water at any time during its use, in accordance with 40 CFR 264.193(b) and (c).	The types of secondary containment devices considered acceptable are liners (external to the tank), vaults, double-walled tanks, and equivalent devices that are approved by the Regional Administrator. Design parameters for secondary containment systems are listed in 40 CFR 264.193(c). The secondary containment systems must be: o Lined and/or constructed of materials compatible with the contained waste and designed to withstand pressure gradients, physical contact with any released waste, climatic conditions, and daily operational stresses (including hazards posed from nearby vehicular traffic); o Placed on a foundation which can support it, can withstand any foreseeable pressure gradients, and prevent failure due to settlement, compression, or uplift; o Equipped with a leak-detection system that will detect the presence of a release within 24 hours (unless the Permittee has demonstrated that existing detection technologies or site conditions will not allow detection within 24 hours); and	STHWTS Chapter 7	

EVALUATION CRITERIA

Condition IV.C.3.: Design and Construction of the Secondary Containment System (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	o Sloped or operated to drain and remove any accumulated liquids resulting from spills, leaks, or precipitation within 24 hours (unless the Permittee has demonstrated that removal of the liquids cannot be accomplished within 24 hours).		
	ENFORCEABILITY The tank system inspection schedule in the Permit must provide for inspection, at least once each operating day, of the construction materials and the area immediately surrounding the externally accessible portion of the tank system.		

Condition IV.D.2.: Controls and Practices to Prevent Spills

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify what controls and practices will be used to prevent the spill of hazardous wastes from the tank system, in accordance with 40 CFR 264.194(b).	Underground tanks can be equipped with overfill prevention systems and/or transfer spill prevention systems. Appropriate transfer practices must be followed. The proper elements of an overfill prevention system are: o Sensors for detecting the liquid level in the tank (i.e., float-activated, capacitance, thermal conductivity, ultrasonic, optical, displacer, hydrostatic head);	STHWTS Chapter 9	

EVALUATION CRITERIA

Condition IV.D.2.: Controls and Practices to Prevent Spills (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	o High-level alarms that activate when a tank overfill is imminent; o Automatic shut-off devices to prevent overfill from occurring; o Tying in the unloading process with the overfill prevention system to prevent any unloading when the system is non-operative; and o Bypass prevention system to assure that the overfill prevention system cannot be overridden by an operator. The proper elements of a transfer spill prevention system are: o Couplings equipped with spring-loaded valves which automatically block flow when hoses are disconnected and o Emergency shut-off valves. Similarly, tanks located above ground, onground, or inground can be equipped with overfill prevention and transfer spill prevention systems. Appropriate transfer practices must also be followed. The proper elements of an overfill prevention system are:		

EVALUATION CRITERIA

Condition IV.D.2.: Controls and Practices to Prevent Spills (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	o Sensors and gauges to indicate the liquid level in the tank. Float-activated, displacer, and hydrostatic-head sensors are most commonly used. Capacitance, thermal conductivity, ultrasonic and optical sensors are also used; o High-level alarms; o Automatic shut-down controls or automatic flow diversion controls to prevent overfilling; o Provisions for emergency overflow to adjacent tanks to collect overflowing materials; and o Daily monitoring by a trained operator. The proper elements of a transfer spill-prevention system are: o Transfer of hazardous waste from established stations equipped with curbing, paving, and catchment facilities; o Couplings equipped with spring-loaded valves which automatically block flow when hoses are disconnected; and o Use of redundant valves and instrumentation.		

EVALUATION CRITERIA

Condition IV.D.2.: Controls and Practices to Prevent Spills (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY Gauge readings should be monitored and recorded during inspections. The inspection schedule must provide for inspection, at least once each operating day, of the spill prevention equipment.		

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Description]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
Except as noted, the permit must contain a description of a double liner system to be installed at the site. Included with the description must be a design drawing of the system [40 CFR 264.221(c)].	Exceptions: a) No liner system is required for existing units (40 CFR 264.221), except that all sites must be retrofitted with a double liner system by November 8, 1988 or closed. b) An exemption from the double liner system requirements can be granted for alternative designs. c) Other exemptions and exceptions as outlined in guidance memo. The permit must contain a description of the double liner system. The double liner system should consist of the following: o top flexible membrane liner o leachate detection system, with provisions for collection of any leakage o bottom liner consisting of a soil liner at least 3 feet thick of a 3-foot-thick soil liner directly beneath a second flexible membrane liner.	HSWA Liner Mem	

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Description (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	Documentation would include drawings of the areal extent of the liner system with a detailed cross-sectional drawing of the liner system. To be exempt under the existing portion rule, the administrative record must include documentation of the extent of the existing portion in the form of a drawing and written description. In addition, the record must indicate the dates when the facility was constructed and waste was placed. Other exemptions and the required documentation are complex. Therefore refer to the noted reference or to current guidance from Headquarters. These exemptions could consist of an exemption from the double liner requirement (i.e., only use a single liner or no liner at all) and are based on site-specific design and/or operating procedures. To be granted, these other exemptions will require extensive documentation along with a detailed technical review. The administrative record must contain documentation of that review and a notification of the approval of exemption by the RA. Finally, the permit fact sheet should include a justification of the exemption.		

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Description (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	Double liner systems installed by the operator prior to permit issuance which meet the requirements may fall under the good faith compliance rule and may not need to be replaced; see guidance.		
	ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 226(a).		

Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.

V. SURFACE IMPOUNDMENTS

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Flexible membrane liner material, thickness, and manufacturer]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain flexible membrane liner specifications. Each surface impoundment unit, except for exempt units is required to have two or more liners [40 CFR 264.221(a) and (c)].	At least one of the liners must be a flexible membrane liner. The permit may indicate the brand name and manufacturer of the flexible membrane liner. In most cases a detailed material specification of more than one specific liner will be provided with a note that the final selection will be made at the time of installation subject to final approval of the RA.	GDLS PWGM pp. 6-11 to 6-61 GDLS pp. 2-8 p. 13 pp. 38-45	
	The permit must indicate that the double liner system will consist of a top flexible membrane liner that is at least 30 mils thick and is compatible with the waste and leachate. In addition, unless documentation is provided in the administrative record that the soil liner is thick enough to contain the leachate; the bottom liner must also include a 30-mil or thicker flexible membrane liner.	SW-846 NSF	
	Documentation of flexible membrane liner compatibility should consist of test results from EPA Method 9090 testing of the flexible membrane liner. In some cases other data, such as historical or existing site data, may be used.		

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Flexible membrane liner material, thickness, and manufacturer (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	Documentation of sufficient liner strength should consist of calculations computing the loads and stresses, such as operational and construction loads or waste loads, which are applied to the flexible membrane liner along with a comparison of those loads against the strength of the flexible membrane liner as determined by the Method 9090 testing. Finally, the administrative record must contain documentation that all the calculations and data dealing with flexible membrane liner have been reviewed for technical adequacy and have been accepted. The documentation usually will consist of a checklist or review form indicating that the calculations and data have been checked or reviewed and are acceptable. Also, in some cases verification calculations by the technical reviewer may be provided. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a).		

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Flexible membrane liner material, thickness, and manufacturer (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

Condition V.C.1.: Liner System [Flexible membrane liner bedding]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include a description for the bedding material used both above and below the flexible membrane liner to protect it [40 CFR 264.221(a)].	The material must be (SP) material or finer, as classified by the Unified Soil Classification System. Documentation would consist of material specifications for the materials to be used for the layers of the liner system that the flexible membrane liner rests on and that are placed on the flexible membrane liner. In some cases other material will be used for bedding, in which cases documentation such as calculations, historical data, or test data be provided that indicates equivalent protection of the liner. If calculations or test data are provided, the administrative record must contain documentation that the data have been technically reviewed and approved.	GDLS pp. 16-17 PWGM pp. 6-11 to 6-31	

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Flexible membrane liner bedding (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	In some cases no protective layer will be provided for the top flexible membrane liner. In those cases the flexible membrane liner thickness will likely need to be greater than 30 mils. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

Condition V.C.1.: Liner System [Flexible membrane liner installation procedures, including seaming]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed flexible membrane liner material specifications and installation procedures [40 CFR 264.221].	Included within the specifications must be such items as: o liner manufacturer (optional),	SW-870 pp. 298-305 pp. 345-373 pp. 403-414	

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Flexible membrane liner installation procedures, including seaming (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	o liner brand name (optional),	GDLS pp. 38-45	
	o liner thickness,		
	o liner chemical and physical properties,		
	o method of liner field seaming,		
	o method of liner subgrade preparation,		
	o method of anchoring the liner,		
	o handling procedures, and		
	o placement procedures.		
	ENFORCEABILITY		
	The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction per 40 CFR 264.226(a).		
	Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System (Exposure prevention)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include provisions for protection of the flexible membrane liner from exposure [40 CFR 264.221]	Protection is usually provided by placing a cover layer of soil or other material over the flexible membrane liner. If this is not done, or if the flexible membrane liner will be exposed for long periods due to phased construction, then the record must contain test data demonstrating that sunlight, wind, rain, freeze/thaw, etc., will not harm the liner. The record must include documentation (e.g. notes, calculations) that such data have been technically revieved and approved. In addition, it is likely that the flexible membrane liner thickness will have to exceed 30 mils. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	PWGM pp. 6-11 to 6-31 CQA	

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Soil liner thickness and material specifications]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain specifications for a soil liner. Each surface impoundment unit except for exempt units is required to have a have a bottom soil liner which is at least 3 feet thick with a permeability of $1x10^{-7}$ cm/sec or less [40 CFR 264.221(a) and (c)]. (Note: If only one flexible membrane liner is present, then the soil liner thickness must be computed.)	If the bottom liner consists of a flexible membrane liner placed on a soil liner, the soil liner must be at least 3 feet thick with a minimum permeability of $1x10^{-7}$ cm/sec and the flexible membrane liner must be placed directly on the soil liner. If the bottom liner does not contain a flexible membrane liner component, then the soil liner must be at least 3 feet thick with a minimum permeability of $1x10^{-7}$ cm/sec and the administrative record must contain calculations which model the soil liner. The model is used to determine the necessary soil liner thickness, and the soil liner must be thick enough so that any leachate generated by the surface impoundment does not flow completely through the soil liner during the active life, closure period, and 30-year post-closure period. When completing the calculations, it must be assumed (per agency guidance) that the top flexible membrane liner began leaking during the first year of operation. The administrative record must include documentation, such as a checklist or supporting calculations, indicating that the soil liner thickness evaluation has been technically reviewed and accepted.	GDLS p. 17 pp. 45-48 SW-869 SW-84-001 SW-925 pp. 29-30	

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Soil liner thickness and material specifications (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The administrative record must contain documentation (i.e., testing data) that the soil liner is compatible with the leachate expected to be generated at the facility. The administrative record must contain documentation that the soil liner has sufficient strength to resist the loads and stresses placed on it. In some cases the administrative record may contain test data indicating the permeability of the soil proposed for use as the soil liner. Or, the record may indicate that in-place soil is to be amended with bentonite or other material to lower its permeability; in which case, a mix design supported by test data would be provided. If test data are provided, they must include a description of the testing procedures, the test results, and an analysis of the results. The administrative record must contain a checklist, or other documentation, which indicates that the design data have been technically reviewed and were accepted.		

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System (Soil liner thickness and mate .al specifications (cont'd))

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan to contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Soil liner construction specifications]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed material and construction specifications for placement of the soil liner [40 CFR 264.221(a)].	Items addressed must include: o removal of rocks, roots and other unsuitable material from the soil o placed in lifts that are less than 6 inches thick. o requires the breaking up of soil clods, if necessary o proper addition of water if necessary o not constructed of frozed soil, along with prevention of freezing or compacted material, and o seal-rolling of final lift for smooth surface. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a).	GDLS pp. 18-20	

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Soil liner construction specifications (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Design specifications]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
Each surface impoundment unit, except for exempt units is required to have a leachate detection zone located beneath the top flexible membrane liner and above the bottom liner [40 CFR 264.221(c)]. The design plans attached to the permit must contain specifications for a leachate detection system.	The permit must contain the following for the leachate detection system: o A description, including drawings, of the operation and design of the system. o Each portion of the system must have a minimum slope of 2% o A graded granular filter of filter fabric to prevent clogging of the system is required. o The granular material should have a permeability of 1×10^{-7} cm/sec or greater and must be at least 12 inches thick.	GDLS pp. 4-11 pp. 31-44 PWGM pp. 9-60 to 9-108 SW-869	

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Design specifications (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	o The granular layer may be replaced by an artificial drainage material provided it has equivalent flow capacity. o A drainage tile system of appropriate size and spacing with a sump pump or other means to efficiently remove leachate is required. The administrative record must contain the following for the leachate detection system: o Drawings showing the extent of the system, pipe layouts, slopes, and typical cross-sections must be provided. o Data showing the chemical compatibility of all components of the system with waste and leachate must be provided. o If a granular filter is used, the record must include calculations which show compliance with the requirements discussed on pages 9-94 through 9-97 of the reference (PWGM). o The record must contain documentation, either with test data or acceptable engineering analysis, of the permeability of the granular material or equivalent capacity of artificial drainage material.		

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Design specifications (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	o The record must include calculations which verify that the pipe sizing and spacing have sufficient capacity. o The administrative record must contain documentation in the form of engineering analysis that the granular drainage layer is stable under the loads and stresses placed on it. o Calculations along with material properties which show that all components of the system have sufficient strength to support the loads that they will be subjected to must be provided. The 12-inch-thick layer of granular material on a 2% slope with pipe requirements can be waived if an equivalent drainage system is provided. In that case the record must contain calculations and data which show that the designed system has flow capacity equivalent to the recommended 12-inch granular layer. Criteria to be judged for equivalence are listed on pages 9, 10, 35 and 36 of the reference (GDLS).		

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Design specifications (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The record must also contain documentation, such as checklist or supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved. **ENFORCEABILITY** The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). --- Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Leachate detection system - material specifications]

REGULATORY REQUIREMENT

The permit must contain detailed material specifications for all components of the leachate detection system [40 CFR 264.221].

TECHNICAL SOUNDNESS

Included must be such items as applicable:

- o pipe specifications,
- o granular material gradations,
- o artificial drainage material specifications,
- o pump specifications, and
- o sump specifications.

ENFORCEABILITY

The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a).

Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.

REFERENCES

GDLS
pp. 39-44

FINDINGS/COMMENTS

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Leachate detection system - installation specifications]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain detailed construction specifications for constructing the leachate detection system [40 CFR 264.22]	The construction specifications should address the following procedures. o pipe placement procedures, o protection of the liners during placement of the systems o construction procedures for the sumps, and o placement of the granular material and filters. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a).	GDLS pp. 39-44	

Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Foundation preparation]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The liner system must be placed on a foundation capable of supporting the liner system and resistant to forces which could result in liner failure due to settlement, compression, or uplift [40 CFR 264.221(a)(2)].	The administrative record must contain geotechnical data and engineering calculations which describe the liner system foundation and verify that is has sufficient strength to support the liner and prevent failures. Detailed discussions of the data requirements and the analyses are included in the reference. Items which must generally be included are items normally included in the documentation in support of liner foundation design and to demonstrate sufficient strength include the following: o test borings information (i.e., location plan and boring logs); o results of soil and/or rock testing; o engineering calculations for settlement analysis, bearing capacity analysis, and landfill slope analysis; and o discussion of the potential excess gas or hydrostatic uplift pressure and subsidence and sinkhole potential.	GDLS pp. 39-44 PWGM pp. 6-46 to 6-58 CQA	

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.1.: Liner System [Foundation preparation (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The record also must contain detailed foundation construction specifications and a construction quality assurance procedure for preparation of the foundation. The necessary items are site specific, and are discussed in general in the references. Finally, the record must contain documentation, such as checklists or supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved. **ENFORCEABILITY** The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a).	GDLS pp. 39-44	

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.4.: Prevention of Overtopping

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify the design of hydraulic features to prevent im-	The administrative record must contain an engineering report and detailed plans providing the necessary documentation to support the design of	PAGM pp. 5-24 to 5-27	

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.4.: Prevention of Overtopping (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
poundment overtopping as per 40 CFR 264.221(f). The design may incorporate hydraulic features, such as channels, spillways, pipes, pumps, etc., to be operated either manually or automatically.	all hydraulic features to prevent overtopping. Report and plan information should include the size and capacity calculations of all hydraulic structures such as pumps, pipes, weirs, principal and emergency spillways, channels, reservoir level controllers, etc. The impoundment, including appurtenant hydraulic structures, must be designed to prevent overtopping from a 100-year, 24-hour storm event. A table or graph correlating reservoir storage and elevation may be provided. The magnitude of the 100-year, 24-hour storm must be determined using data from the U.S. Weather Bureau Technical Publication 40 or other acceptable data. In the event that runoff from the surrounding area enters the impoundment, calculations must be provided from the peak discharge and/or volume resulting from a 100-year, 24-hour storm event. If foolproof overtopping controls are not employed, the administrative record must contain a water balance study for the life of the impoundment. The study must verify that the impoundment will not be overtopped during normal operations	PWGM pp. 6-64 to 6-77 PAGM p. 5-37 and pp. 5-42 to 5-44	

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.4.: Prevention of Overtopping (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	and the 100-year, 24 hour-storm event. The study may involve normal inflow and outflow volumes, evaporation, the 100-year, 24-hour storm runoff volume, and freeboard. The impoundment design must include run-on control through either inclusion of run-off volumes within the impoundment or diversion of run-on from the impoundment. Wind effects on the impoundment must be calculated in accordance with U.S. Bureau of Reclamation "Design of Small Dams," U.S. Army Corps of Engineers ETL 1110-2-221 "Wave Runup and Wind Setup on Reservoir Embankments," or other acceptable procedures. The administrative record must include documentation (e.g., calculations, notes) that the surface impoundment is designed and operated to prevent overtopping. In addition, the record must show that a technical review was conducted on the design of the impoundment and all appurtenant structures. ENFORCEABILITY The permit must specify the monitoring and inspection plan to be followed during construction as per 40 CFR 270.17(c) and include an inspection plan		

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.4.: Prevention of Overtopping (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	to be followed during impoundment operation, per 40 CFR 264.226(b). The operating inspection plan must specify that the impoundment and all hydraulic structures be inspected weekly and after storms and earthquakes. The permit must also stipulate that records be maintained of all inspections, per 40 CFR 264.15(d).		

Condition V.C.5.: Dike Design, Construction and Maintenance

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must demonstrate the structural integrity of all dikes in accordance with 40 CFR 224.221(g).	The administrative record must contain an engineering report and detailed plans supporting the dike design, including erosion protection. Dikes must be designed with sufficient structural integrity to prevent massive failure. The following elements must be incorporated in the dike design: o foundation conditions o embankment materials o impoundment liner o waste material	PWGM pp. 6-78 to 6-85 PAGM pp. 5-27 to 5-32 PWGM pp. 6-133 to 6-134 PAGM pp. 5-45 to 5-48	

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.5.: Dike Design, Construction and Maintenance (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	Long-term effects of external factors such as frost, wind, rain, temperature, vegetation, etc., must be evaluated. Dike stability assessments must be conducted assuming no functional liner. Information on dike integrity must include: o design plans, technical specifications and schedules o results of field and laboratory investigations of strength, compressibility, Atterberg limits, etc., for foundation and dike materials o data on geologic, hydrogeologic, and hydrologic conditions including groundwater levels, bedrock conditions, and seismic setting o slope stability and failure assessments for various loading conditions including rapid drawdown, partial pool, steady state seepage, earthquakes, foundation soil bearing failure, failure of dike slopes, or failure of drainage systems, covers, or liners		

EVALUATION CRITERIA

Condition V.C.: Design, Construction and Operating Requirements

Condition V.C.5.: Dike Design, Construction and Maintenance (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	o erosion potential from rainfall, surface water runoff, leakage through dikes, and contact with wastes o evaluation of liquification tendencies o evaluation of seismic effects All references, analytical methods, computer models, and field and laboratory test data must be identified. In addition, the record must show via calculations, notes or other date that a technical review was conducted on the dike design specifications. **EWFORCEABILITY** The permit must include a certification by a qualified engineer which attests to the structural integrity of the dike as per 40 CFR 270.17(d).		

EVALUATION CRITERIA

Conditions V.E 1. - 3.: Inspection Schedules and Procedures

[Inspection and quality assurance program]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include a detailed construction quality assurance program [40 CFR 264.221]	The plan must indicate or provide the following: o qualifications of inspectors, o frequency of inspections, o testing procedures to be used to test the liner seams, and o documentation procedures to be used. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a).	GLDS pp. 38-45 SW-870 pp. 250-253 CQA	

Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.

EVALUATION CRITERIA

Conditions V.E.1. - 3.: Inspection Schedules and Procedures

[Construction inspection and monitoring program]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain a construction quality assurance plan for determining that the soil liner has been constructed per the plans and specifications [40 CFR 264.226].	Included must be: o testing of soil materials for permeability, classification, and density; o procedures for in-place permeability testing; o inspection of the material during placement and the placement and compaction procedures; o documentation procedures; and o qualifications of the inspectors. **ENFORCEABILITY** The permit must include provisions for certification per 40 CFR 270.30(k)(2) and inspection during construction per 40 CFR 264.226(a). --- Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	GDLS pp. 38-44 CQA	

EVALUATION CRITERIA

Condition VI.C.1.: Liner system - description of liner system

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain a description of a liner system to be installed at the site. Included with the description must be design drawings of the system (40 CFR 264.251).	The permit must contain a description of the liner system. The liner system must consist of the following: o leachate collection system o synthetic or soil liner Documentation would include drawings showing the aerial extent of the liner system with a detailed cross-sectional drawing of the liner system. If exempt as an enclosed dry pile, the administrative record must include documentation (e.g., testing data, design plans, specifications) verifying the following (40 CFR 264.250(c)): o liquids or wastes containing free liquids are not placed in the pile, o the pile is inside a structure which prevents run-on, o wind dispersal control is by other means than wetting, o the waste in the pile does not generate leachate.	WPDLS PWGM pp. 7-9 to 7-51	

EVALUATION CRITERIA

Condition VI.C.1.: Liner system - description of liner system (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	Exemptions from the liner requirement, and the required documentation are complex. The Permit Writer should refer to the noted references or to current Agency guidance and policies. **ENFORCEABILITY** New construction must be certified by a registered engineer; and that certification must be submitted to the agency. The requirement to maintain the facility as it is depicted in the plans and specifications is enforced through the agency's enforcement inspection program.		

Condition VI.C.1.: Liner system - synthetic liner material, thickness, and manufacturer

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
Each waste pile unit, except for exempt units is required to have a liner. The permit must specify the liner material, thickness and manufacturer [40 CFR 264.251(a)(1)].	If the liner is a synthetic liner, the permit must indicate the brand name and manufacturer of the synthetic liner. In most cases more than one name will be provided with a note that the final selection will be made at the time of installation subject to final approval of the RA. The permit must indicate that the synthetic liner must be at least 30 mils thick and that it is compatible with the waste and leachate.	PWGM pp. 7-16 to 7-51 SW-846 NSF WPDLS	

EVALUATION CRITERIA

Condition VI.C.1.: Liner system - synthetic liner material, thickness, and manufacturer (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	Documentation of synthetic liner compatibility must generally consist of test results from EPA Method 9090 testing of the synthetic liner. In some very limited cases, other data, such as historical or existing site data, may be used. Documentation of sufficient liner strength must consist of calculations computing the loads and stresses, such as operational and construction loads or waste loads, which are applied to the synthetic liner along with a comparison of those loads against the strength of the synthetic liner as determined by the Method 9090 testing. The administrative record must contain documentation that all the calculations and data dealing with the synthetic liner have been reviewed for technical adequacy and have been accepted. The documentation will usually consists of a checklist or review form indicating that the calculations and data have been checked or reviewed and are acceptable. Also, in some cases verification calculations by the technical reviewer may be provided.		

EVALUATION CRITERIA

Condition VI.C.1.: Liner system - synthetic liner material, thickness, and manufacturer (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a). --- Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

Condition VI.C.1.: Liner system - synthetic liner bedding

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include a description for the bedding material used both above and below the synthetic liner to protect it [40 CFR 264.251(a)(1)].	The material should be (SP) material or finer, as suggested by the Unified Soil Classification (USGS). Documentation should consist of material specifications for the materials to be used to protect the synthetic liner. In some cases other material will be used for bedding, in which case documentation such as calculations, historical data, or test data must be provided that indicate equivalent protection of the liner. If calculations or test data are	WPDLS PWGM pp. 7-16 to 7-51	

EVALUATION CRITERIA

Condition VI.C.1.: Liner system - synthetic liner bedding (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	provided, the administrative record must contain documentation that the data have been technically reviewed and approved. **ENFORCEABILITY** The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a). --- Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

Condition VI.C.1.: Liner system - synthetic liner installation procedures, including seaming

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed synthetic liner material specifications and installation procedures [40 CFR 264.251(a)(1)].	Included within the specifications must be such items as: o liner manufacturer, o liner brand name, o liner thickness, o liner chemical and physical properties,	SW-870 pp. 298-305 pp. 345-373 pp. 403-414 PWGM pp. 7-16 to 7-51	

EVALUATION CRITERIA

Condition VI.C.1.: Liner system - synthetic liner installation procedures, including seaming (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	o method of liner field seaming, o method of liner subgrade preparation, o method of anchoring the liner, o handling procedures, and o placement procedures. **ENFORCEABILITY** The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	WPDLS	

Condition VI.C.1.: Liner system - exposure prevention

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include provisions for protection of the synthetic liner from exposure	Protection is usually provided by placing a cover layer of soil or other material over the synthetic liner.	PWGM pp. 7-16 to 7-51 WPDLS	

EVALUATION CRITERIA

Condition VI.C.1.: Liner system - exposure prevention (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
[40 CFR 264.251(a)].	If this is not done, or if the synthetic liner will be exposed for long periods due to phased construction, then the record must contain test data demonstrating that sunlight, wind, rain, freeze/thaw, etc., will not harm the liner. The record must include documentation (e.g., notes, calculations) that such data have been technically reviewed and approved. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).		

Condition VI.C.1.: Liner system - soil liner construction procedures

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed material and construction specifications for placement of the soil liner [40 CFR 264.251(a)(1)].	Items addressed must include: o removal of rocks, roots and other unsuitable material from the soil, o placed in lifts that are less than 6 inches thick,	PWGM pp. 7-16 to 7-51 WPDLS	

EVALUATION CRITERIA

Condition VI.C.1.: Liner system - soil liner construction procedures (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	o requires the breaking up of soil clods if necessary o proper addition of water if necessary, o not constructed of frozen soil along with prevention of freezing of compacted material, and o seal-rolling of final lift for smooth surface. **ENFORCEABILITY** The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).		

Condition VI.C.1.: Liner system - liner system foundation preparation

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify procedures for liner foundation preparation. The liner system must be placed on a foundation capable of supporting the liner system and resistant to forces	The administrative record must contain geotechnical data and engineering calculations which describe the liner system foundation and verify that it has sufficient strength to support the liner and prevent failures. Detailed discussions of the data requirements and the analyses are included in the reference.	PWGM pp. 7-37 to 7-39 WPDLS	

EVALUATION CRITERIA

Condition VI.C.1.: Liner system - liner system foundation preparation (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
which could result in liner failure due to settlement, compression, or uplift [40 CFR 264.251(a)(1)(ii)].	Items normally provided in support of the liner foundation design include the following. o test boring information (i.e., location plan and boring logs); o results of soil and/or rock testing; o engineering calculations for settlement analysis, bearing capacity analysis; o discussion of the potential excess gas or hydrostatic uplift pressure and subsidence and sinkhole potential. The record also must contain detailed foundation construction specifications and a construction quality assurance procedure for preparation of the foundation. The necessary items are very site specific and are discussed in the references. Finally, the record must contain documentation, such as checklists or supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254.		

EVALUATION CRITERIA

Condition VI.C.2.: Leachate collection system - design description

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
Each waste pile unit, except for exempt units is required to have a leachate collection system placed above the liner [40 CFR 264.251(a)(2)].	The permit must contain the following for the leachate collection system: o A description must be provided including drawings of the operation and design of the o Each portion of the system must have a minimum slope of 2%. o The layer must be at least 12 inches thick. o A graded granular filter or filter fabric to prevent clogging of the system must be included in the design. o The granular material should have a permeability of $1x10^{-1}$ cm/sec or greater and must be at least 12 inches thick. o The granular layer may be replaced by an artificial drainage material, provided it has equivalent flow capacity. o A drainage collection system of appropriate size and spacing with a sump pump or other means to efficiently remove leachate is required.	PWGM pp. 7-51 to 7-100 SW-869 GDLS pp. 9-10 pp. 35-36 WPDLS	

EVALUATION CRITERIA

Condition VI.C.2.: Leachate collection system - design description (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The administrative record must contain the following for the leachate collection system: o Drawings showing the extent of the system, pipe layouts, slopes, and typical cross-sections must be provided. o Data showing the chemical compatibility of all components of the system with the waste and leachate must be included. o If a granular filter is used, the record must include calculations which show compliance with the requirements discussed on pages 7-81 through 7-96 of the reference. o The record should contain documentation either with test data or acceptable engineering analysis of the permeability of the granular material. o The record should include calculations which verify that the pipe sizing and spacing have sufficient capacity. o The record should include calculations along with material properties which show that all components of the system have sufficient strength to support the loads that they will be subjected to.		

EVALUATION CRITERIA

Condition VI.C.2.: Leachate collection system - design description (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The 12-inch-thick layer of granular material on a 2% slope with pipe requirements can be waived if an equivalent drainage system is provided. In that case the record must contain calculations and data which show that the alternate system has a flow capacity equivalent to that of the recommended 12-inch granular layer. Criteria to be judged for equivalence are listed on pages 9, 10, 35 and 36 of the reference. The record must also contain documentation, such as checklists or supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).		

Condition VI.C.2.: Leachate collection system - material specifications

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain detailed material specifications for all components of the leachate collection	Included must be such items as applicable: o pipe specifications,	PWGM pp. 7-51 to 7-100 WPDLS	

EVALUATION CRITERIA

Condition VI.C.2.: Leachate collection system - material specifications (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
system [40 CFR 264.251(a)(2)].	o granular material gradations, o pump specifications, and o sump specifications. **ENFORCEABILITY** The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).		

Condition VI.C.2.: Leachate collection system - leachate head restriction

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain a provision that the maximum leachate in the leachate collection system cannot exceed one foot [40 CFR 264.251(a)(2)].	The administrative record must contain verified engineering calculations showing that leachate collection system has sufficient capacity to maintain a leachate depth of less than or equal to one foot. A detailed discussion of the necessary calculations is contained on pages 7-55 through 7-62 of the reference. The record also must contain documentation, such as checklists or supporting calculations, indicating that the engineering calculations have been technically reviewed and are approved.	PWGM pp. 7-51 to 7-100 WPDLS	

EVALUATION CRITERIA

Condition VI.C.2.: Leachate collection system - leachate head restriction (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).		

Condition VI.C.2.: Leachate collection system - installation procedures

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain detailed construction specifications for constructing the leachate collection system [40 CFR 264.251(a)(2)].	Included must be such as applicable: o pipe placement procedures, o protection of the liners during placement of the systems, o construction procedures for the sumps, and o placement of the granular material and filters. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).	PWGM pp. 7-51 to 7-100 WPDLS	

EVALUATION CRITERIA

Condition VI.C.2.: Leachate collection system - inspection and quality assurance program during installation

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include a detailed construction quality assurance program [40 CFR 264.254(a)(1)].	The plan must provide the following: o qualifications of inspectors, o frequency of inspections, o testing procedures to be used to test the liner seams, and o documentation procedures to be used. **ENFORCEABILITY** The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).	SW-870 pp. 250-253 PGWM pp. 7-16 to 7-51 WPDLS	

Condition VI.D.2.: Liner system - construction inspection and monitoring program

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain a construction quality assurance plan for determining that the soil liner has been constructed as per the plans and specifications (40 CFR 264.254).	Included must be: o testing of soil material for permeability, classification, and density; o inspection of the material during placement and the placement and compaction procedures; o documentation procedures; and o qualifications of the inspectors.	PWGM pp. 7-16 to 7-51 WPDLS	

EVALUATION CRITERIA

Condition VI.D.2.: Liner system - construction inspection and monitoring program (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).		

Condition VI.D.2.: Leachate collection system - inspection and monitoring procedures during installation

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain a construction quality assurance plan to assure that the leachate collection system is constructed in accordance with the plans and specifications (40 CFR 264.254).	Included as applicable must be such items as: o qualifications of the inspectors, o testing procedures, o inspection during placement of the materials, and o documentation procedures. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).	PWGM pp. 7-51 to 7-100 WPDLS CQA pp. 39 to 47	

EVALUATION CRITERIA

Condition VII(A) B.: Permitted and Prohibited Waste Identification

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify the wastes that are to be applied to the land treatment unit [40 CFR 264.271(a)(1)].	The wastes to be applied to the land treatment must be analyzed for the hazardous constituents listed in Appendix VIII for purposes of waste stream verification.	HWLT pp.107-134	
The permit must specify the wastes that must be degraded, transformed or immobilized [40 CFR 264.271(b)].	The administrative record must contain documentation of a technical review performed by the permit writer indicating that the waste stream being applied to the treatment unit contains only the wastes described in the permit.		
	ENFORCEABILITY		
	The permit must include a condition requiring maintenance of records of the wastes applied to the land treatment unit per 40 CFR 264.73 and 264.279. 40 CFR 270.30 provides right of entry to the facility for inspection purposes.		

EVALUATION CRITERIA

Condition VII(A) C. Treatment Program

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permittee may implement a land treatment program that is designed to ensure that hazardous constituents placed in or on the treatment zone are degraded, transformed or immobilized within the treatment zone (40 CFR 264.271).	The treatment program must: - specify the wastes capable of being treated in the unit based on the land treatment demonstration; - include a list of hazardous constituents expected to be in or derived from the wastes to be land treated based on waste stream analyses; - include an unsaturated zone monitoring provisions meeting the requirements of 40 CFR 264.278; and - include the vertical and horizontal dimensions of the treatment zone as as defined in the permit. The administrative record must contain verification as to the technical soundness of the components of the treatment program by the permit writer. This information must include a soil boring log and the results of all soil sample analyses. The analyses must verify that the depth of the treatment zone does not exceed that defined in this permit condition. Results of studies documenting the depth of the seasonal high water table, including boring logs and depth-to-water table measurements, must also be included. This information must show	PAGM-HWLTSD pp. 7-44 to 7-46	

EVALUATION CRITERIA

Condition VII(A).C.: Treatment Program (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	that the maximum depth of the treatment zone is located at least three feet above the seasonal high water table and no more than five feet below the initial soil surface. ENFORCEABILITY This condition is enforceable under 40 CFR 264.278, unsaturated zone monitoring requirements.		

Condition VII(A).D.: Design Construction and Operating Requirements

REGULATORY REQUIREMENT (Condition VII(A).D.1.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify that the land treatment system will be designed, constructed, operated and maintained according to approved plans and specifications included in the permit [40 CFR 264.273(a)]. The permit must specify the rate and method of application of hazardous constituents, measures to	The administrative record must contain documentation that the selection of rate and method of application, measures to control soil pH, measures to enhance microbial or chemical reactions and measures to control moisture content of the treatment zone was based on the results of the treatment demonstration.	HWLT pp. 373-405	

EVALUATION CRITERIA

Condition VII(A).D.: Design Construction and Operating Requirements (cont'd)

REGULATORY REQUIREMENT (Condition VII(A).D.1.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
control soil pH, measures to enhance microbial or chemical reactions and measures to control moisture content in the treatment zone [40 CFR 264.273(a)(1),(2),(3) and (4)].	This information must include, for all wastes to be placed in the treatment unit, specification of: - Rate Limiting Constituent - that compound or element which restricts the amount of waste which can be applied per year. - Application Limiting Constituent - that compound or element which restricts the amount of waste which can be applied per application. - Capacity Limiting Constituent - that compound or element which restricts the total amount of waste which can be applied to the soil over the life of the treatment unit. In setting the loading rate, consideration must have been given to the following major classes of constituents in the waste: - Organic constituents in terms of their potential for volatization, leaching, run-off and degradation; - Metals content of the waste considering the leaching potential of the metals based on the cation exchange capacity of the soils;		

EVALUATION CRITERIA

Condition VII(A).D.: Design Construction and Operating Requirements (cont'd)

REGULATORY REQUIREMENT (Condition VII(A).D.1.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	- Nitrogen and phosphorous content of the waste; - Soluble salts content of the waste; and - Water content of the waste.		
	In addition, this information must contain a description and technical verification of the following items related to soil pH control:	HWLT pp. 465-468 PAGM pp. 7-41	
	- Sampling Protocol - a description of the frequency, location and procedures used to determine soil pH. - pH Control Calculations - the method used to calculate chemical amendments for pH control and the range pH to be maintained. - pH Control Method - the chemicals to be used to control soil pH and description of how they will be applied to the treatment zone.		
	The documentation must also provide support for the measures used to enhance microbial and chemical reactions. This information must include a description and technical verification of the following items:	HWLT p. 372 PAGM pp. 7-14	

EVALUATION CRITERIA

Condition VII(A).D.: Design Construction and Operating Requirements (cont'd)

REGULATORY REQUIREMENT (Condition VII(A).D.1.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	- Sampling Protocol - a description of the frequency, location and procedures used to determine additions of soil necessary to enhance microbial or chemical reactions. - Nutrients Additions - the method used to calculate soil amendments and specification of the C:N:P ratio to be maintained. - Soil Nutrient Control Methods - the chemicals to be used to enhance microbial and chemical reactions and description of how they will be added to the treatment zone.		
	The administrative record must include documentation supporting the measures to control soil moisture in the treatment zone. This information must contain a description of the methods used to monitor soil moisture, the range of soil moisture to be maintained and the methods to be used to control soil moisture.	PAGM pp. 7-41	

EVALUATION CRITERIA

Condition VII(A).D.: Design Construction and Operating Requirements (cont'd)

REGULATORY REQUIREMENT (Condition VII(A).D.1.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The use of the approved methods of waste application, soil pH control microbial and chemical reaction enhancement can be enforced through inspection under 40 CFR 270.30(1)(3). The permit must include a condition requiring maintenance of records of waste application rates and dates per 40 CFR 264.73 and 264.279. Proper control of soil moisture is enforceable through inspection under 40 CFR 270.30(1)(4).	PAGM pp. 47-46 and 49-51 HWLT pp.425-427	

REGULATORY REQUIREMENT (Condition VII(A).D.2.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify that the land treatment system be designed, constructed, operated and maintained to minimize run-off of hazardous constituents from the treatment zone during the active life of the unit [40 CFR 264.273(b)].	The permit and the administrative record must contain plans and specifications for run-off control features. The administrative record must also include a technical review containing a verification of all calculations and specifications used in the design and construction of the run-off control system.		

EVALUATION CRITERIA

Condition VII(A).D.: Design Construction and Operating Requirements (cont'd)

REGULATORY REQUIREMENT (Condition VII(A).D.2.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY Proper operation and maintenance of of the run-off control system is enforceable by agency inspection under 40 CFR 270.30 (i)(3).		

REGULATORY REQUIREMENT (Condition VII(A).D.3.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify that a run-on control system be designed, constructed, operated and maintained so as to prevent flow onto the treatment zone during peak discharge from at least a 24-hour, 25-year storm [40 CFR 264.273(c)].	The permit must contain plans and specifications which demonstrate that the run-on control system is capable of preventing flow onto the treatment zone during peak discharge from at least a 24-hour, 25-year storm. The administrative record must include a technical review which contains verification of all calculations and specifications used in the design and construction of the run-on control system. ENFORCEABILITY Proper operation and maintenance of the run-on control system is enforceable through inspection under 40 CFR 264.273 (g) and 270.30(i)(3).	HWLT p. 425	

EVALUATION CRITERIA

Condition VII(A).D.: Design Construction and Operating Requirements (cont'd)

REGULATORY REQUIREMENT (Condition VII(A).D.4.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify that a run-off management system be designed, constructed, operated and maintained so as to collect and control at least the water volume resulting from a 24-hour, 25-year storm [40 CFR 264.273(d)].	The permit must contain plans and specifications which demonstrate how the run-off management system will collect and control at least the water volume resulting from a 24-hour, 25-year storm. The administrative record must include a technical review which verifies all calculations and specifications used in the design and construction of the run-off management system. ENFORCEABILITY Proper operation and maintenance of the run-off management system is enforceable through inspection under 40 CFR 264.273(g) and 270.30(l)(3).	HWLT pp. 425-428	

REGULATORY REQUIREMENT (Condition VII(A).D.5.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify that collection and holding facilities (e.g., tanks or basins) associated with run-on and run-off control systems must be emptied or		HWLT pp.425-427	

EVALUATION CRITERIA

Condition VII(A).D.. Design Construction and Operating Requirements (cont'd)

REGULATORY REQUIREMENT (Condition VII(A).D.5.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
otherwise managed expeditiously after storms to maintain the design capacity of the system [40 CFR 264.273(e)].	ENFORCEABILITY Proper operation and maintenance of the run-on and run-off collection and and holding facilities is enforceable through inspection under 40 CFR 264.273 (g) and 270.30 (i)(3).		
REGULATORY REQUIREMENT (Condition VII(A).D.6.)	**TECHNICAL SOUNDNESS**	**REFERENCES**	**FINDINGS/COMMENTS**
The permit must specify that the treatment unit will be managed so as to control wind dispersal of particulate matter [40 CFR 264.273(f)].	The administrative record must contain a technical review of the equipment and procedures used to monitor wind dispersal of particulate matter. If the treatment zone will not be managed to control wind dispersal, the permit writer should include a condition which prohibits placement of dispersable particulate matter in the treatment zone.	HWLT pp.454-455 and 548	

EVALUATION CRITERIA

Condition VII(A).D.: Design Construction and Operating Requirements (cont'd)

REGULATORY REQUIREMENT (Condition VII(A).D.6.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY This permit condition is enforceable through inspection under 40 CFR 264.273 (g) and 270.30(i)(3).		

Condition VII(A).E.: Unsaturated Zone Sampling and Monitoring

REGULATORY REQUIREMENT (Conditions VII(A).E.1.-4.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify that the soil and soil-pore liquid in the unsaturated zone between the lower limit of the treatment zone and the seasonal high water table will be monitored to determine if hazardous constituents have migrated out of the treatment zone. [40 CFR 264.278(a)] The permit must specify that the permittee install and operate an unsaturated zone monitoring system using soil cores and soil-pore liquid monitoring using devices such as lysimeters. The system must consist of a sufficient number of sampling points at appropriate locations and depths to yield adequate samples [40 CFR 264.278(b)].	The administrative record must contain extensive documentation relating to the unsaturated zone monitoring program (plan). The information must specify and verify by way of a technical review the following items: - Sampling locations - The locations of soil-pore liquid samples and soil core samples must be established randomly to ensure representative placement of the samples. Additional "hot-spots", such as the toes of slopes, may also be selected as sampling points. - Sampling frequency - Sampling of soil cores and soil-pore liquid must be conducted according to the frequency established in the permit. Soil-pore	PGM/UZM-HWLT, Chapters 2-4 HWLT pp. 532-544	

EVALUATION CRITERIA

Condition VII(A).E.: Unsaturated Zone Sampling and Monitoring (cont'd)

REGULATORY REQUIREMENT (Conditions VII(A).E.1.-4.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permittee must establish a background value for each hazardous constituent to be monitored under Part 264.271(b). The permit will specify the values for each constituent or specify the procedures to be used to calculate the values. [40 CFR 264.278(c)].	liquid sampling is most effective following a precipitation event. - Analytes of interest - The constituents to be monitored for are those expected to be present in the hazardous wastes identified in Condition VII(A).B.1. or principal hazardous constituents (PHC). PHCs are hazardous constituents contained in the wastes to be applied to the units which are the most difficult to treat.		
The permit must specify that soil monitoring and soil-pore monitoring will be conducted immediately below the treatment zone. The permit must also specify the frequency and timing of the monitoring [40 CFR 264.278(d)].	The administrative record must document that the basis for selecting the frequency and timing of soil and soil-pore monitoring was the frequency, timing and rate of waste application, and the soil permeability.	PGM-UZM/HWLT Chapters 2-4	

REGULATORY REQUIREMENT (Condition VII(A).E.5.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify the sampling and analysis procedures to be used in the soil and soil-pore monitoring under Part 264.278(a). [40 CFR 264.278(e)]	The administrative record must contain a detailed description of the sampling and analysis procedures to include (at a minimum) sample collection, sample preservation and shipment, analytical procedures and chain of custody control.	PGM-UZM/HWLT Chapters 2-4 HWLT pp. 532-544	

EVALUATION CRITERIA

Condition VII(A).E.: Unsaturated Zone Sampling and Monitoring (cont'd)

REGULATORY REQUIREMENT (Condition VII(A).E.6.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permittee must determine whether there is a statistically significant change over background values for each constituent monitored under Part 264.278(a) each time sampling under Part 264.278(d) is conducted. In determining whether the statistically significant increase has occurred, the permittee must use the statistical procedures specified in the permit. The permittee must complete the statistical determination within a reasonable period of time after completing the sampling. [40 CFR 264.278(f)]	The permit writer should consider the complexity of the statistical procedures and the availability of laboratory facilities to perform the analyses in determining the time period for completing the statistical evaluation.		

REGULATORY REQUIREMENT (Condition VII(A).E.7.)	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify that if a statistically significant change over background values occurs, the permittee will notify the Regional Administrator within seven days in writing and will indicate which constituents have shown the increases. The permit must also specify that in the event a statistically significant increase occurs, the permittee will, within ninety days, submit to the Regional Administrator a permit modification to modify the facility operating practices to maximize the success of degradation, transformation of immobilization processes in the treatment zone. [40 CFR 264.278(g)]	The administrative record must contain documentation of the technical review conducted on the facility's evaluation of its land treatment unit operating practices, design and location in the event significant contamination is detected.	HWLT pp. 542-544	

EVALUATION CRITERIA

Condition VII(A).E.: Unsaturated Zone Sampling and Monitoring (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The requirements of Part 264.278 are enforceable through specific permit conditions.		

Condition VII(A).F.: Inspection Schedules and Procedures

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify that the permittee will inspect the land treatment unit weekly, after storms and in accordance with the inspection schedule included in the permit for evidence of deterioration, malfunctions or improper operation of run-on and run-off control systems and, if applicable, improper functioning of wind dispersal control measures. [40 CFR 264.273(f)]	While weekly and post-storm inspections are required, daily inspections of all active portions of the treatment unit are highly desirable. These inspections should include observations of waste spreading and incorporation, and freeboard space of run-off retention structures. ENFORCEABILITY Inspection requirements are enforceable by incorporating an inspection schedule into the permit, and under Part 270.30(i)(3).	HWLT p. 514	

EVALUATION CRITERIA

Condition VII(B).D.: Land Treatment Demonstration Requirements

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify the types of tests used in the demonstration and the analytical procedures used [40 CFR 264.272(b)].	The permit must identify the specific laboratory procedures in the subject demonstration. The following items pertaining to laboratory treatment demonstrations should be addressed: o Laboratory Demonstration Methodologies - The permit must include specification of the type of test(s) to be used, and the materials and methods to be employed. The test used must simulated conditions in the land treatment unit including waste loading rates, soil conditions, and climatic conditions. o Analytical Procedures - The permit must include the type of analytical procedures to be used in the analysis of wastes used in the demonstration and soil core and soil-pore liquid samples. This must include the sampling methods, sample handling protocol, and analysis procedures. o Worker Protection - The permit must specify the steps to be taken to ensure worker protection during the laboratory demonstration. This includes such items as safety equipment and emergency plans. In all cases, the demonstration must show that hazardous constituents in the waste can be transformed, immobilized, or degraded.	PGM-HWLTD pp. 43-59	

EVALUATION CRITERIA

Condition VII(B) D.: Land Treatment Demonstration Requirements (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The conduct of laboratory demonstrations is enforceable by agency inspection under 40 CFR 270.30(i), and through the recordkeeping requirements of 40 CFR 270.30(j).		

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Description of liner system]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain specifications for a double liner system and a description of a double liner system to be installed at the site. Included with the description must be design drawings of the system [40 CFR 264.301(a) and (c)].	The permit must contain a description of the double liner system. The double liner system should consist of the following: o top flexible membrane liner o leachate detection system, with provisions for collection of any leakage o bottom liner consisting of a second flexible membrane liner at least 30 mils thick and a 3-foot-thick compacted soil liner with a permeability of no more than 1×10^{-7} cm/sec directly beneath the second flexible membrane liner. Documentation would include drawings showing the areal extent of the liner system with a detailed cross-sectional drawing of the liner system. Exemptions from the double-liner requirements, and the required documentation, are complex. The Permit Writer should refer to the current Agency guidance and policies. These exemptions are based on site-specific design and/or operating procedures, and will require extensive documentation along with a detailed technical review. The administrative	HSWA Liner Memo	

Condition VIII.C.1.: Liner System

[Description of liner system (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	record must contain documentation of that review and a notification of the approval of the exemption by the RA. The permit fact sheet should include a justification of the exemption. [No exemptions are allowed in Alabama per 40 CFR 264.301(k)].		
	ENFORCEABILITY The permit must contain design plans and specifications for the liner system. The permit also must contain conditions requiring inspection during construction as per 40 CFR 264.303(a) and certification as per 40 CFR 270.30(k)(2). --- Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Flexible membrane liner material, thickness, and manufacturer]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
Each landfill unit, except for exempt units is required to have two or more liners [40 CFR 264.301(a) and (c)].	Guidance requires that at least one of the liners be a flexible membrane liner. The permit may indicate the brand name and manufacturer of the flexible membrane liner. In most cases a detailed material specification for more than one specific liner will be provided with a note that the final selection will be made at the time of liner installation, subject to final approval of the RA. The permit must indicate that the double liner system must consist of a top flexible membrane liner that is at least 30 mils thick and that it is compatible with the waste and leachate. In addition, unless documentation is provided in the administrative record that the soil liner is thick enough to contain the leachate; the bottom liner must also include a 30-mil or thicker flexible membrane liner. Documentation of flexible membrane liner compatibility usually must consist of test results from EPA Method 9090 testing of the flexible membrane liner. In some very limited cases, other data, such as historical or existing site data, may be used.	PWGM pp. 9-10 to 9-30 GDLS pp. 2-8 p. 13 pp. 38-45 SW-846 NSF	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Flexible membrane liner material, thickness, and manufacturer (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS

Documentation of sufficient liner strength must consist of calculations computing the loads and stresses, such as operational and construction loads or waste loads, which are applied to the flexible membrane liner along with a comparison of those loads against the strength of the flexible membrane liner as determined by the Method 9090 testing.

Finally the administrative record must contain documentation that all calculations and data associated with the flexible membrane liner have been reviewed for technical adequacy and have been accepted. The documentation will usually consist of a checklist or review form indicating the calculations and data have been checked or reviewed and are acceptable.

ENFORCEABILITY

The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).

Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Flexible membrane liner bedding]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include a description for the bedding material used both above and below the flexible membrane liner to protect it (40 CFR 264.301).	The material should be (SP) material or liner, as classified by the Unified Soil Classification System. Documentation would consist of material specifications for the materials to be used for the layers of the liner system that the flexible membrane liner rests on and that are placed on the flexible membrane liner. In some cases, other material will be used for bedding, in which case, documentation such as calculations, historical data, or test data must be provided that indicates equivalent protection of the liner. If calculations or test data are provided, the administrative record must contain documentation that the data have been technically reviewed and approved. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a). --- Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	GDLS pp. 16-17 PWGM pp. 9-27	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Flexible membrane liner installation procedures, including seaming]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed flexible membrane liner material specifications and installation procedures (40 CFR 264.301).	Included within the specifications must be such items as: o liner manufacturer (optional), o liner brand name (optional), o liner thickness, o liner chemical and physical properties, o method of liner field seaming, o method of liner subgrade preparation, o method of anchoring the liner, o handling procedures, and o placement procedures. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).	SW-870 pp. 298-305 pp. 345-373 pp. 403-414 GDLS pp. 38-45	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System (cont'd)

[Inspection and quality assurance program during installation]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include a plan providing for a detailed construction quality assurance program (40 CFR 264.301).	The plan must indicate or provide the following: o qualifications of inspectors, o frequency of inspections, o testing procedures to be used to test the liner seams, and o documentation procedures to be used. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).	GLDS pp. 38-45 SW-870 pp. 250-253 CQA	

Condition VIII.C.1.: Liner System

[Exposure prevention]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include provisions for protection of the flexible	Protection usually is provided by placing a cover layer of soil or other material over the flexible membrane liner.	PWGM pp. 9-27 to 9-30	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Exposure prevention (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
membrane liner from exposure (40 CFR 264.301).	If this is not done, or if the flexible membrane liner will be exposed for long periods due to phased construction, then the record must contain test data demonstrating that sunlight, wind, rain, freeze/thaw, etc., will not harm the liner. The record must include documentation that such data have been technically reviewed and approved. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).		

Condition VIII.C.1.: Liner System

[Soil liner thickness and material specifications]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
Each landfill unit except for exempt units is required to have a bottom soil liner which is at least 3 feet thick with a permeability of $1x10^{-7}$ cm/sec or	If the bottom liner consists of a flexible membrane liner placed on a soil liner, the soil liner must be at least 3 feet thick with a minimum permeability of $1x10^{-7}$ cm/sec or less and the flexible membrane liner must be placed directly on the soil liner.	GDLS p. 17 pp. 45-48 SW-869	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Soil liner thickness and material specifications (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
less [40 CFR 264.30(a) and (c)]. (Note: If only one flexible membrane liner is present, then the soil liner thickness must be computed.]	If the bottom liner does not contain a flexible membrane liner component then the soil liner must be at least 3 feet thick with a minimum permeability of $1x10^{-7}$ cm/sec or less and the administrative record must contain calculations which model the soil liner. The model is used to determine the necessary soil liner thickness, and the soil liner must be thick enough so that any leachate generated by the landfill does not flow completely through the soil liner during the active life, closure period, and 30-year post-closure period. When doing the calculations, it must be assumed that the top flexible membrane liner began leaking during the first year of operation (as per agency guidance). The administrative record must include documentation, such as a checklist or supporting calculations, indicating that the soil liner thickness evaluation has been technically reviewed and accepted. The administrative record must contain documentation that the soil liner is compatible with the leachate expected to be generated at the facility.	SW-84-001 SW-925 pp. 29-30	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Soil liner thickness and material specifications (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The record also must contain documentation that the soil liner has sufficient strength to resist the loads and stresses placed on it. In some cases the administrative record may contain test data indicating the permeability of the soil proposed for use as the soil liner. Or, the record may indicate that in-place soil is to be amended with bentonite or other material to lower its permeability; in which case, a mix design supported by test data would be provided. If test data are provided, they must include a description of the testing procedures, the test results, and an analysis of the results. The administrative record must contain a check-list, or other documentation, which indicates that the design data has been technically reviewed and was accepted. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).		

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Soil liner thickness and material specifications (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

Condition VIII.C.1.: Liner System

[Soil liner construction procedures]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed material and construction specifications for placement of the soil liner (40 CFR 264.301).	Items addressed include: o removal of rocks, roots and other unsuitable material from the soil, o placed in lifts that are less than 6 inches thick, o requires the breaking up of soil clods if necessary, o proper addition of water if necessary,	GDLS pp. 18-20	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Soil liner construction procedures (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	o not constructed of frozen soil along with prevention of freezing of compacted material, and o seal-rolling of final lift for smooth surface. **ENFORCEABILITY** The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Construction inspection and monitoring program]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain a construction quality assurance plan for determining that the soil liner has been constructed as per the plans and specifications (40 CFR 264.301 and 264.303).	The construction testing and monitoring program specified in the permit must contain, at a minimum: o testing of soil, material for permeability, classification, and density; o inspection of the material during placement and the placement and compaction procedures; o procedures for in-place permeability testing; o documentation procedures; and o qualifications of the inspectors. **ENFORCEABILITY** The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).	GDLS pp. 38-44 CQA	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

(Leachate collection/removal system - design description)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain specifications for two leachate collection systems. Each landfill unit, except for exempt units, is required to have two leachate collection systems, one placed above and one below the top flexible membrane liner (40 CFR 264.301).	The permit must contain the following for both leachate collection systems: o A description including drawings of the operation and design of each system. o Each portion of the systems must have a minimum slope of 2%. o A graded granular filter or filter fabric to prevent clogging of the system should be specified. o The granular material should have a permeability of $1x10^{-7}$ cm/sec or greater, and must be at least 12 inches thick. o The granular layer may be replaced by an artificial drainage material provided it has equivalent flow capacity. o A drainage tile system of appropriate size and spacing with a sump pump or other means to efficiently remove leachate.	GDLS pp. 4-11 pp. 31-44 PWGM pp. 9-60 to 9-108 SW-869	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Leachate collection/removal system - design description (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The administrative record should contain the following for both leachate collection systems: o Drawings showing the extent of the system, pipe layouts, slopes, and typical cross-sections. o Data showing the chemical compatibility of all components of the systems with the waste and leachate. o If a granular filter is used, the record must include calculations which show compliance with the requirements discussed on pages 9-94 through 9-97 of the reference (PWGM). o The record must contain documentation in the form of test data or acceptable engineering analysis of the permeability of the granular material or equivalent capacity of any artificial drainage material. o The administrative record must contain documentation in the form of engineering analysis that the granular drainage layer is stable under the loads and stresses placed on it.		

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Leachate collection/removal system - design description (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS

- The record must include calculations which verify that the pipe sizing and spacing have sufficient capacity. Each system must have its own sumps and they cannot be interconnected.

- Calculations along with material properties which must be provided show that all components of the system have sufficient strength to support the loads to which they will be subjected.

The 12-inch-thick layer of granular material on a 2% slope with pipe requirements can be waived if an equivalent drainage system is provided. In that case, the record must contain calculations and data which show that the designed system has flow capacity equivalent to that of the recommended 12-inch granular layer. Criteria to be judged for equivalence are listed on pages 9, 10, 35 and 36 of the reference (GDLS).

The record must also contain documentation, such as checklist of supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved.

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Leachate collection/removal system - design description (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).		

Condition VIII.C.1.: Liner System

[Leachate collection/removal system - material specifications]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain detailed material specifications for all components of the leachate collection and removal system (40 CFR 264.301).	The material specifications should address, at a minimum, the following items. o pipe specifications, o granular material gradations, o artificial drainage material specifications, o pump specifications, and o sump specifications.	GDLS pp. 39-44	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Leachate collection/removal system - material specifications (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30 (k)(2) and inspection during construction as per 40 CFR 264.303(a).		

Condition VIII.C.1.: Liner System

[Leachate collection/removal system - leachate head restriction]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain a provision that the maximum SP leachate in the leachate collection system cannot exceed one foot (40 CFR 264.301).	The administrative record must contain verified engineering calculations showing that leachate collection system has sufficient capacity to maintain a leachate depth of less than or equal to one foot. A detailed discussion of the necessary calculations is contained on pages 9-64 through 9-71 of the reference. The record also must contain documentation, such as checklists or supporting calculations, indicating that the engineering calculations have been technically reviewed and are approved.	PWGM pp. 9-64 to 9-71	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Leachate collection/removal system - leachate head restriction (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).		

Condition VIII.C.1.: Liner System

[Leachate collection/removal system - installation procedures]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain detailed construction specifications for constructing the leachate collection and removal systems (40 CFR) 264.301)	The installation procedures specified in the permit should address, at a minimum, the following items: o pipe placement procedures, o protection of the liners during placement of the systems, o construction procedures for the sumps, and o placement of the granular material and filters.	GDLS pp. 39-44	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Leachate collection/removal system - installation procedures (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).		

Condition VIII.C.1.: Liner System

[Leachate collection/removal system - inspection and monitoring procedures during installation]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must contain a construction quality assurance plan to assure that the leachate collection and removal systems are constructed in accordance with the plans and specifications (40 CFR 264.301 and 264.303).	The construction inspection and monitoring procedures addressed in the permit should include: o qualification of the inspectors, o testing procedures, o inspection during placement of the materials, and o documentation procedures. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).	GDLS pp. 38-44 CQA	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

(Liner system foundation preparation)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The liner system must be placed on a foundation capable of supporting the liner system and resistant to forces which could result in liner failure due to settlement compression up uplift (40 CFR 264.301(a)).	The administrative record must contain geotechnical data and engineering calculations which describe the liner system foundation and verify that it has sufficient strength to support the liner and prevent failures. Detailed discussions of the data requirements and the analysis are included in the reference. General items which should be addressed in support of the foundation preparation procedures include: o test boring information (i.e., location plan and boring logs); o results of soil and/or rock testing; o engineering calculations for settlement analysis, bearing capacity analysis, and landfill slope analysis; and o discussion of the potential excess gas or hydrostatic uplift pressure and subsidence and sinkhole potential.	GDLS pp. 39-44 PWGM pp. 69-31 to 9-50 CQA	

EVALUATION CRITERIA

Condition VIII.C.1.: Liner System

[Liner system foundation preparation (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The record also must contain detailed foundation construction specifications and a construction quality assurance procedure for preparation of the foundation. The necessary items are very site specific, but are discussed in general in the references. Finally, the record must contain documentation, such as checklists or supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved. ENFORCEABILITY The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).		

Condition VIII.C.6.: Runoff Control System

[Design]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must describe the runoff control design as per 40 CFR	The administrative record must contain an engineering report and drawings having the necessary documentation supporting the design of the runoff	PWGM pp. 9-127 to 9-134	

EVALUATION CRITERIA

Condition VIII.C.6.: Runoff Control System

[Design (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
270.21(b)(3) and 264.301(g). The design may incorporate features such as channels, holding basins and tanks, pipes, spillways, ditches, ponds etc.	control system. The runoff control system is required to collect and control, at a minimum runoff from active landfill areas resulting from the 25-year, 24-hour storm event. Information must include the size and capacity calculations of all hydraulic structures such as pumps, pipes, weirs, spillways, channels, tanks, ponds, etc. The magnitude of the 25-year, 24-hour storm may be determined using data from the U.S. Weather Bureau Technical Publication 40 or other acceptable data. Calculations must be provided for both the runoff peak discharge and volume resulting from a 25-year, 24-hour storm event. Peak discharge and volume must be calculated in accordance with the U.S. Department of Agriculture Soil Conservation Service procedures or similar procedures. Units used to hold runoff must meet the applicable 40 CFR 264 standards (Subpart K for Surface Impoundments, Subpart J for Tanks, etc.). In addition, the record must contain documentation in the form of calculations, notes, etc., to show that a technical review was conducted on the runoff control system design.	PAGM pp. 8-33 to 8-37	

EVALUATION CRITERIA

Condition VIII.C.6.: Runoff Control System

[Construction procedures]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify construction procedures for the runoff control system as per 40 CFR 270.21(b)(3) and 264.301(g).	The administrative record must contain an engineering report and drawings having the necessary documentation supporting construction procedures. The information must include detailed construction and material specifications. A detailed description of the construction quality control program also must be provided. In addition, the record must contain documentation (e.g., calculations, notes) showing that a technical review was conducted of the construction procedures. ENFORCEABILITY The permit must specify the monitoring and inspection plan to be followed during construction as per 40 CFR 270.21(d). The permit must require certification by a professional engineer that the runoff control system has been constructed as designed as per 40 CFR 270.30(l)(2). --- Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	PWGM pp. 9-127 PAGM pp. 8-33 PWGM pp. 9-147 to 9-177 and pp. 4-5 PAGM pp. 8-44 to 8-48 CQA	

EVALUATION CRITERIA

Condition VIII.C.6.: Runoff Control System

[Maintenance]

REGULATORY REQUIREMENT

The permit must specify a maintenance plan for the runoff control system as per 40 CFR 270.21(b)(3) and 264.301(g)

TECHNICAL SOUNDNESS

The administrative record must contain an engineering report having the necessary documentation supporting the maintenance plan. The plan must contain a detailed description of all maintenance operations and the schedule for completing each operation.

In addition, the record must show that a technical review was conducted of the maintenance plan.

ENFORCEABILITY

The operation inspection plan must stipulate that the runoff control system be inspected for damage and malfunction weekly and after storms. The permit must specify the repairs that will be performed in the event that inspection discloses damage or malfunction. The permit also must require that records be maintained of all inspections and repairs or corrective actions.

Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.

REFERENCES

PWGM
pp. 9-127

PAGM
pp. 8-33

PAGM
pp. 9-177 to 9-183

PAGM
pp. 8-49 to 8-50

FINDINGS/COMMENTS

EVALUATION CRITERIA

Condition VIII K.: Liquids in Landfills

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
Bulk and containerized liquid wastes can only be placed in landfills under certain very controlled conditions (40 CFR 264.314).	Liquid wastes can only be placed in landfills if they have been solidified. This includes bulk or noncontainerized liquids and containerized liquids. The ban also applies to both hazardous and nonhazardous liquids. Exceptions: o no other method of disposal exists as outlined in 40 CFR 264.314(e) o some liquids can be placed in the landfill if for beneficial purposes (see guidance) The administrative record must contain documentation that the method of liquid stabilization is not an absorbent operation, as discussed in the references. It also must indicate the procedures to be followed in testing, handling, and disposing of these wastes within the landfill. **ENFORCEABILITY** The permit must contain a provision for testing wastes using the "Paint Filter Test" (Method 9095 as required by 40 CFR 270.30(j).	BLHW PNHL	

EVALUATION CRITERIA

Condition VIII.K.: Liquids in Landfills (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The permit also must contain a condition requiring the owner/operator to maintain records of the testing results in accordance with 40 CFR 270.30(j).		

Condition VIII.F.: Closure and Post-Closure Care

[Final cover design]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
Each landfill unit must be covered at closure with a cover which minimizes the migration of liquid through the cover, requires little maintenance, promotes drainage, minimizes erosion, accommodates settling and subsidence and has a permeability less than or equal to the bottom liner (40 CFR 264.310).	The cover should consist of the following (from bottom to top): o a 2-foot-thick soil layer having a permeability of $1x10^{-7}$ cm/sec or less, o a 20 mil or thicker flexible membrane liner, o a 12-inch-thick drainage layer, o a vegetation crop. The slope of the final cover surface should be at least 3%.	LDFC pp. 23-33 PGWM pp. 9-197 to 9-201 SW-867 CQA pp. 47-54	

EVALUATION CRITERIA

Condition VIII.F.: Closure and Post-Closure Care

[Final cover design (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS

The detailed description and drawings of the cover should include the following items.

- o drawings showing overall plan view of cover with dimensions and cross-sections showing slopes, layers, and thicknesses;
- o the name, species, and variety of the cover crop;
- o strength, thickness, brand name, and manufacturer (or detailed material specifications) of flexible membrane liner;
- o description of drainage layer;
- o characteristics, thickness, permeability of low permeable soil layer;
- o potential settlement of the cover;
- o potential for gas generation; and
- o effects of freeze-thaw cycles on the cover.

EVALUATION CRITERIA

Condition VIII.F.: Closure and Post-Closure Care

[Final cover design (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	Also included must be detailed engineering calculations addressing: o erosion of the cover soils, o free drainage of precipitation off of the cover, o free drainage of the drainage layer, and o potential of clogging of the drainage layer. In cases where a cover design other than the recommended cover is used, the record must contain detailed engineering calculations which address: o Long-term minimization of liquids through the cover and o A demonstration that the permeability of the cover is equal to or less than that of the landfill liner or subsoils.		

EVALUATION CRITERIA

Condition VIII.F.: Closure and Post-Closure Care

[Final cover design (cont'd)]

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	Documentation such as checklists or supporting calculations must be included in the record to show that the engineering analyses provided by the applicant have been technically reviewed and are approved. ENFORCEABILITY The permit must include provisions for certification of closure as per 40 CFR 264.115.		

EVALUATION CRITERIA

Condition IX(A).B.: Identification Criteria for Permitted and Prohibited Waste

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The hazardous waste constituents specified in the permit must be those which were burned successfully at least to a 99.99 percent DRE during the trial burn, or constituents which exhibit higher heats of combustion [40 CFR 264.344(a)].	The types and quantities of hazardous waste constituents to be burned in the incineration system must be limited in the permit. A Permittee is not permitted to burn hazardous waste constituents whose heat of combustion values (the accepted measure of the degree of difficulty for the constituents to burn) are lower than the POHCs successfully incinerated in the trial burn. Waste constituents may only be restricted if they are listed in Appendix VIII of 40 CFR Part 261. There are two options for identifying the allowable waste feed to the incinerator. The first option covers situations where it is not practical to list all the wastes that a facility might be permitted to burn. In this options, criteria are identified to establish limitations on the physical and chemical characteristics of the waste input to the incinerator. The second option is more appropriate for so-called "on-site" incinerators used as a part of a chemical process or manufacturing operation. In that instance, it is usually straightforward to specifically identify the waste constituents or classes of wastes that the Permittee is permitted to burn. Limitations must be established for each type of waste fed to the incinerator system. For example, if the incinerator accepts both solid and liquid feeds, limitations for each must be set in the permit based on the trial burn results.	GM-HWIP EH-HWI	

Condition IX(A).B.: Identification Criteria for Permitted and Prohibited Waste (cont'd)

REGULATORY REQUIREMENT	ENFORCEABILITY	REFERENCES	FINDINGS/COMMENTS
	Quantitative limitations on waste feed must be set forth in the permit. In addition, the waste analysis provisions must specify a frequency for verifying that the waste feed is within the physical and chemical composition limits specified in the permit. [40 CFR 264.341(b)]		

Condition IX(A).C.: Construction, Instrumentation, and Operational Performance Requirements

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify operating conditions for each waste feed stream to the incinerator to assure that the incineration facility meets the performance standards [40 CFR 264.343 and 264.345].	It is possible that an incineration system can be permitted for more than one waste feed (e.g., the incinerator could operate on one definable waste feed during the summer and another during the winter). In such cases, a complete set of operating limits must be specified for each waste feed.		
	The permit operating conditions for each waste feed must include each of the following: carbon monoxide concentration in the stack gas, waste feed rate, combustion temperature, and a measure of combustion gas flow rate. Other operating conditions can be set where the Permit Writer finds it necessary to assure compliance with the DRE, HCl, and particulate standards. Examples are air pollution control system operating conditions (e.g., wet scrubber water recirculating rate and pH). The limits set forth in the permit must be	GM-HWIP pp. 4-2 through 4-14 FR-86-119/ESD	

EVALUATION CRITERIA

Condition IX(A).C.: Construction, Instrumentation, and Operational Performance Requirements (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	based on the trial burn results, data in lieu of a trial burn, or from the manufacturer's specifications.		
	The operating conditions should allow for variations in incineration system operating procedures. For example, combustion temperature could be specified as a minimum of 2350 degrees F. Some allowance for normal variations is needed in order to protect against unnecessary activation of the waste feed cut-off system.	GM-HWIP pp. 5-7	
	ENFORCEABILITY		
	Each set of operating conditions must directly relate to achieving the performance standards. A key purpose of the trial burn is to identify operating conditions that prevail when it is demonstrated through extensive sampling and analyses that the incineration system is in compliance with the performance standards. EPA does not intend to require the Permittee to conduct frequent trial burns, which are both costly and time consuming. Thus, for purposes of permit enforcement, compliance with the operating conditions set forth in the permit is regarded by EPA as compliance with the performance standards [40 CFR 264.343(d)]. If the Permittee complies with the permit operating conditions, but it is later shown that the performance standards are not being attained, the permit may be modified or revoked and reissued.		

EVALUATION CRITERIA

Condition IX(A).E.: Monitoring Requirements

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permit must specify a monitoring system for each specified operating condition (40 CFR 264.347).	Monitoring systems must be specified for each of the operating conditions (e.g., combustion temperature, waste feed rate, carbon monoxide concentration in the stack gas) listed in the permit. The frequency of monitoring, testing, and calibration must be specified along with the method for recording the monitoring data. Combustion temperature, waste feed rate, combustion gas velocity indicator and CO stack gas concentration must be recorded continuously. ENFORCEABILITY Frequencies for monitoring each operating condition must be specified in the permit. The permit must include a provision for recording and maintaining monitoring data pursuant to 264.347(d).		

Condition IX(A).F.: Waste Feed Cut-Off Requirements

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
A system must specified in the permit to automatically cut off waste feed to the incinerator whenever the operating conditions deviate from the limits	The purpose of the automatic waste cut-off system is to shut off all waste feed to the incinerator whenever the operating conditions are outside the limits specified in the permit. The cutoff valves on the waste feed lines must be interlocked to the appropriate operating conditions (e.g., stack gas carbon monoxide level,	GW-HWIP pp. 4-14 through 4-16 and 4-25	

EVALUATION CRITERIA

Condition IX(A).F.: Waste Feed Cut-Off Requirements (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
designated in permit (40 CFR 264.345(e)).	combustion temperature). A calibration frequency and test frequency must be specified in the permit. The regulations [40 CFR 264.347(c)] require weekly testing, but monthly testing can be allowed where the Permittee has demonstrated that weekly testing will be disruptive and that monthly inspection is sufficient. ENFORCEABILITY Numerical limits must be set for each permitted operating condition which activates the automatic waste feed cut-off system. The calibration and test frequency must be recorded in the operating log. The log can be reviewed during site inspections by EPA or State personnel.		

EVALUATION CRITERIA

Condition IX(B) C.: Trial Burn Phase

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
A permit for incineration may be granted to conduct a trial burn, to operate the incinerator, or both. When a permit includes provisions for a trial burn, permit conditions must address the requirements of 40 CFR 264.344(c)(2) and 270.62.	The trial burn forms the foundation of a hazardous waste incineration system permit. The trial burn must demonstrate compliance with performance standards and establish operating conditions to ensure continuous long-term compliance with the performance standards. The permit must include the complete trial burn plan as an attachment. The trial burn plan must include all of the information required in 40 CFR 270.62(b)(2). The permit must specify one or more proncipal organic hazardous constituents (POHCs) for each hazardous waste stream to be burned during the trial burn. These POHCs could be major constituents of the waste stream or could be materials having relatively low BTU content used to "spike" the waste stream. A review of Chapter 2 of the Guidance Manual for Hazardous Waste Incineration Permits is required to assure that appropriate POHCs have been specified in the permit. Since the Regional Administrator can approve the trial burn plan only if it gives enough information to establish operating conditions, the applicant must modify the plan to include all POHCs the Regional Administrator specifies.	GM-HWIP Chapter 2 FR-86-119/ESD	

EVALUATION CRITERIA

Condition IX(B) C.: Trial Burn Phase (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	The permit must specify that the Permittee must make the determinations required by 40 CFR 270.62(b)(6)(i)-(ix). The permit also must require the permittee to submit to EPA a copy of all data collected during the trial burn and the results of all the determinations required by 40 CFR 270.62(b)(6) within 90 days after the completion of the trial burn.		
	ENFORCEABILITY The trial burn plan provides protocols and schedules which are incorporated into the permit. All aspects of the trial burn plan thus are enforceable.		

EVALUATION CRITERIA

Condition X.B.: Well Location, Installation and Construction

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify in detail the individual elements of the detection monitoring system including the number, location, sampling depths, and design features of all background and compliance point wells. [40 CFR 264.97(a) and (c)]	The monitoring well system must first and foremost be consistent with supporting information in the Part B Permit Application identifying the uppermost aquifer (as defined in 40 CFR §260.10) and the site specific hydrogeology, including the ground-water elevation, flow rates and directions. It is essential that the hydrologic units beneath the site be accurately and adequately described. The heterogeneous nature of the subsurface necessitates that careful planning be used for the selection of well locations, well depths and the screen intervals. In general, the complex (or heterogeneous) hydrogeologic systems require greater investigation and more monitoring wells. The administrative record must include all aspects of well design and construction, criteria for well locations, etc. The TEGD reference should be followed very closely in evaluating the permit application and writing the Permit. The information provided must adequately identify all potential release pathways from the regulated units. This information, along with the type of potential leakage associated with a regulated unit, are the critical factors for the design of the monitoring well system. Compliance point monitoring wells must be located at the hydraulically downgradient limit of the waste management area.	PWGM-GWP pp. 15-82, 194 TEGD Chapters 1 through 3 GWMIM	

EVALUATION CRITERIA

Condition X.B.: Well Location, Installation and Construction (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify in detail the individual elements of the detection monitoring system including the number, location, sampling depths, and design features of all background and compliance point wells. [40 CFR 264.97(a) and (c)]	If a proposed location for a hazardous waste management facility is being reviewed, or if a facility being permitted is thought to be in a hydrologically sensitive area, the Criteria For Identifying Areas of Vulnerable Hydrogeology Under the Resource Conservation and Recovery Act Guidance Manual and Appendices should be consulted, as well as the TEGD. ENFORCEABILITY Assurance that the monitoring well network is constructed and maintained as specified in the Permit is obtained via Agency inspection of monitoring facilities as per 40 CFR 270.30(i)(4).	C.I.V.H., TEGD	

Condition X.C.: Indicator Parameters and Monitoring Constituents

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify the indicator parameters and/or monitoring constituents for which routine monitoring is required under the detection monitoring program. [40 CFR 264.98(a)]	The indicator parameters and/or monitoring constituents specified in the detection monitoring program to be monitored must be selected so as to be consistent with the goal of detection monitoring to allow the earliest possible indication of leakage from a regulated unit(s). As such, the chosen parameters/constituents must be representative of the waste. In addition, the parameters/constituents should be relatively mobile, stable, and persistent in the subsurface environment.	PWGM-GWP pp. 190-192 pp. 199-200	
The Permit must specify the indicator parameters and/or constituents	The administrative record must contain results of waste characterization, including analysis to identify both the hazardous and nonhazardous constituents of the facility's waste. In addition, the record must identify any	PWGM-GWP pp. 190-192, pp. 199-200	

EVALUATION CRITERIA

Condition X.C.: Indicator Parameters and Monitoring Constituents (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
for which routine monitoring is required under the detection monitoring program. [40 CFR 264.98(a)]	constituents likely to form through chemical reaction. The administrative record must identify those constituents which would be most mobile and persistent, considering all potential attenuation mechanisms. Usually, the most mobile and persistent constituents will be various anions (i.e., chlorides, nitrates, etc.), cations with low adsorption potential, and certain highly mobile organics. Attention also must be given in the record to background levels of proposed parameters/constituents in the facility's ground water compared to levels anticipated in the waste's leachate. If background levels are too high, it may not be possible to correctly identify that ground-water contamination is occurring. There must be documentation (e.g., notes, testing data) in the administrative record that the Permit Writer ensured consideration of all the above factors supporting monitoring parameter/constituent selection, including presence in the waste, mobility/persistence, and detectability. ENFORCEABILITY The Permit may specify reporting requirements for detection monitoring in accordance with 40 CFR 264.98(g), (h), and (i), and 40 CFR 270.31(c). The Permit must specify recordkeeping provisions for detection monitoring in accordance with 40 CFR 270.30(j). The Permit must include provisions for certification of detection monitoring records as per 40 CFR 270.30(k)(4). The Permit must also reserve the right of the Agency to sample or monitor at specified times to assure compliance as per 40 CFR 270.30(i)(4).		

EVALUATION CRITERIA

Condition X.D.: Sampling and Analysis Procedures

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify the procedures and techniques to be used for ground-water sample collection and analysis. [40 CFR 264.97(d)]	The sampling procedures specified in the Permit must be consistent and designed to ensure monitoring results that provide a reliable indication of ground-water quality below the waste management area. Techniques to determine the presence of immiscibles, if the regulated units manage wastes of this type, should be included. Procedures for evacuating stagnant water from the well prior to sampling, determining how much water to evacuate prior to sample collection and procedures for sample collection must be specified. Critical factors in obtaining representative samples include:	PWGM-GWP pp. 83-109 pp. 194-195 MGWSP	
	o Use of inert materials in sampling equipment to ensure the samples are not contaminated or altered by foreign materials.	TEGD Chapter 4	
	o Use of a sampling methodology which does not result in excessive exposure to the atmosphere or other gases causing chemical alteration.		
	o Specification of adequate procedures to prevent cross-contamination; the procedures specified must be chosen to fit the nature of the sample analysis to be performed.		
The Permit must specify the procedures and techniques to be used for ground-water sample analysis. [40 CFR 264.97(e)]	The analytical procedures submitted by the Permittee should describe in detail the analytical procedures used to determine the concentrations of constituents or parameters of interest. The procedures should specify which analytical method per parameter or constituent will be used. The method listed should be in SW-846 or an EPA-approved method preservation methods and holdings times for each parameter/constituent should also be specified.	TEGD Chapter 4	

EVALUATION CRITERIA

Condition X.D.: Sampling and Analysis Procedures (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The Permit must include provisions to require that sampling and measurement during monitoring be representative as per 40 CFR 270.30(j)(1). The Permit must also include provisions for reporting of monitoring results as per 40 CFR 270.30(k)(4) and inspection of monitoring activities as per 40 CFR 270.30(l)(3).		

Condition X.E.: Elevation of the Ground-Water Surface

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
A determination of the ground-water surface elevation must be made each time the ground water is sampled. [40 CFR 264.97(f)]	Recording the elevation of the ground-water surface is a critical factor in the monitoring program. The data is used to determine the amount of water to be evacuated from the well prior to sample collection, to draw potentiometric or water table maps and to ascertain if other factors are influencing the water table such as tidal effects, seasonal variations and off- or on-site well pumping. The Permittee should describe in the application the device and procedure to be used for measuring the elevation of the ground-water surface.	TEGD Chapter 4	

Condition X.F: Statistical Procedures

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify procedures to determine whether there has been a statistically significant	The administrative record must demonstrate that the statistical procedures specified in the Permit are suitable for comparing detection monitoring parameter values to background levels. The basic statistical technique, the Students' t-test, is specified in detail in the regulations under	PWGM-GWP pp. 127-155, pp. 192, 194	

EVALUATION CRITERIA

Condition X.F: Statistical Procedures (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
change over background values established pursuant to 40 CFR 264.98(c), for each parameter or constituent monitored at the compliance point. [40 CFR 264.98(g)(1)]	40 CFR 264.97(h)(1)(i). (Note: 40 CFR 264, Subpart F regulations were undergoing revisions at the time this document was prepared. The new regulations will specify four performance standards that the statistical methods and sampling procedures must meet. The Permit Writer has the option of specifying the basic statistical technique or some other valid technique which may be suitable depending on the data involved. Several alternative procedures are available as outlined in the Agency guidance, such as the Mann-Whitney U Test. Such alternative procedures are applicable only when water quality data exhibits specific characteristics. In specifying the basic Students' t-test or an alternative procedure, the Permit Writer must ensure that the observed characteristics of the monitoring data are such that the procedure is appropriate. For example, the basic Students' t-test is appropriate only when the background levels of a particular parameter are normally distributed (the background sample coefficient of variation is less than 1.00). The administrative record must contain sufficient background data from previous monitoring to allow such a determination.	TEGD Chapter 5	
The Permit must specify procedures to determine whether there has been a statistically significant change over background values established pursuant to 40 CFR 264.98(c), for each parameter or constituent monitored at the compliance point. [40 CFR 264.98(g)(1)]	Alternatively, the Permit may specify a statistical procedure based on probable characteristics for background data with the understanding that a Permit modification may be necessary if subsequently obtained background data indicates this procedure is not suitable.	PWGM-GWP pp. 127-155, pp. 192-194	
	The administrative record must document that suitable statistical procedures have been specified which achieve a reasonable balance between the probability of falsely identifying a non-contaminating regulated unit and the probability of failing to identify a contaminating regulated unit. The record also must document that the specified procedure(s) are suitable in light of background characteristics.	TEGD Chapter 5	

EVALUATION CRITERIA

Condition X.F: Statistical Procedures (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	ENFORCEABILITY The Permit must specify reporting requirements for detection monitoring as per 40 CFR 264.98(h)(1), and (i) and 40 CFR 270.31(c). The Permit must include provisions for certification of statistical results as per 40 CFR 270.30(k)(4).		

Condition X.G.: Monitoring Program and Data Evaluation

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must require that ground-water quality be determined at each monitoring well at the compliance point at least semi-annually. [40 CFR 264.98(d)]	The Permit Writer must require sample collection at least semi-annually; more frequent sampling can be required. Conditions which might merit more frequent sampling are: a high ground-water flow rate; the regulated unit is near ground-water users or sensitive environments; or the wastes are highly toxic.	PWGM-GWP p. 195	
	The regulations do not state that ground-water sampling analytical results and statistical evaluations be routinely submitted. The Permit Writer may elect to require submittal of this data. If the data is to be routinely submitted, the Permittee must report ground-water quality data in a form from which statistical determination can be made to ascertain if a significant statistical increase has occurred.	PWGM-GWP pp. 197-199	
The Permit must require the Permittee to determine the ground-water flow rate and direction annually [40 CFR 264.98(e)]	The regulations do not specify that the annual determination of the ground-water flow rate and direction be reported. However, the permit writer may require that the annual determination be reported and when it should be reported. The information enables the Permit Writer to ensure the monitoring well system is still adequate.	PWGM-GWP pp. 25-31 TEGD	

EVALUATION CRITERIA

Condition X.H.: Recordkeeping and Reporting

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permittee must maintain, in the operating record, monitoring, testing or analytical data were required by Subpart F. [40 CFR 264.73(b)(6)]	All data generated by hydrologic investigations at a facility must be maintained by the Permittee for three years after the data is generated. The three year period may be extended by the request of the Director at any time. The Permittee must maintain information from all ground-water monitoring wells and associated ground-water surface elevations for the active life of the facility, and for disposal facilities for the post-closure period as well. [40 CFR 270.30(j)]		
The Permit must specify that significant changes in the concentration of monitoring constituents be reported to the Regional Administrator within 7 days. [40 CFR 264.98(h)(1)]	All statistically significant increases in monitoring parameters/constituents, changes in hydraulic gradients or any data gathered by the Permittee which may impact the effectiveness of the monitoring system or indicate a release from a regulated unit, must be reported to the Regional Administrator.		
	ENFORCEABILITY		
	The Permit must specify reporting requirements for detection monitoring as per 40 CFR 270.31(c). The Permit must specify recordkeeping requirements as per 40 CFR 270.30(j). The Permit must also include provisions for certification of statistical results per 40 CFR 270.30(k)(4). The Permit may specify reporting requirements for semi-annual, or more frequent, detection monitoring results as per 40 CFR 264.98(h).		

EVALUATION CRITERIA

Condition XI.B.: Well Location, Installation and Construction

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permittee must install a ground-water monitoring system at the compliance point which complies with 40 CFR 264.97(a)(2), (b) and (c). [40 CFR 264.99(b)]	For more detailed information see X. Detection Monitoring, Condition X.B. Compliance monitoring is generally more vigorous than detection monitoring and may require more detailed hydrogeologic investigations and the installation of additional monitoring wells. Monitoring well abandonment may offer a pathway of contamination to deeper ground water hydrologic zones. It is imperative that all monitoring wells that are abandoned be sealed properly to avoid creating such a pathway.	TEGD Chapters 1-3 PWGM-GWP pp. 158-164	

Condition XI.C.: Ground-Water Protection Standard

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify the hazardous constituents and their maximum concentration limits to be monitored for under the compliance monitoring program. [40 CFR 264.92-94 and 264.99]	The Permittee may have been required to sample for Appendix IX 40 CFR 261 constituents in all monitoring wells if a statistically significant increase occurred in any monitoring well for any monitoring parameter or constituent pursuant to 264.98(h)(2). Or, the Permittee may have been required to analyze for hazardous waste or hazardous waste constituents present at the facility in all monitoring wells pursuant to 40 CFR 265.93(d) if any statistically significant increase in any monitoring parameter or constituent was detected.	PWGM-GWP pp. 166-168, 203-214	
The Permit must specify the hazardous constituents and their concentration limits to be monitored under the compliance	Documentation must be provided by the Permittee showing that the monitoring well network and sampling and analysis procedures used to determine the presence and concentration of all Appendix IX constituents were adequate. The Permit Writer must verify that the determination of the presence of all Appendix IX constituents was sufficient.	PWGM-GWP pp. 166-168, 203-214	

EVALUATION CRITERIA

Condition XI.C.: Ground-Water Protection Standard (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
monitoring program. [40 CFR 264.92-94 and 264.99]	The ground-water protection standard (GWPS) is established by identifying all Appendix IX hazardous constituents present in the ground water and specifying a concentration limit for each hazardous constituent identified. The concentration limits are established by one or more of the following: o Existing ground-water data; o The 40 CFR 264.91, Table 1, maximum concentration limits list; o Alternate concentration limits; and o At facilities where there is a high temporal correlation between upgradient and compliance point concentration(s) of hazardous constituents, the concentration limit may be established by sampling upgradient wells each time ground water is sampled at the compliance point.		
	The Permittee may request an alternate concentration limit (ACL) for any hazardous constituent. To grant an ACL the Regional Administrator will review material submitted by the Permittee pursuant to 40 CFR 264.94(b). For detailed information on ACLs, consult the Alternate Concentration Limit Guidance (July, 1987).	ACLG	
	In general, if a constituent is not listed in 40 CFR 264.94, Table 1, or the background concentration is above that allowed by Table 1, no degradation beyond background water quality becomes the standard. The Agency's policy is to not allow any degradation of water quality	PWGM-GWP pp. 166-168	

Condition XI.C.: Ground-Water Protection Standard (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	unless it can be shown that no substantial adverse public health or environmental effects can occur.		
The Permit must specify the hazardous constituents and their concentration limits to be monitored for under the compliance monitoring program. [40 CFR 264.92-264.99]	Generally all Appendix IX constituents identified in the ground water must be specified in the ground-water protection standard (GWPS) for that facility and be included in the list of hazardous constituents to be routinely monitored. The following exclusions/exemptions are possible pursuant to Subpart F: o The constituent(s) cannot reasonably be expected to be in or derived from the waste contained in the facility. [40 CFR 264.93(a)] o The constituent cannot pose a substantial present or potential hazard to human health of the environment. [40 CFR 264.93(b)] An annual determination of all Appendix IX constituents in all monitoring wells is required by 40 CFR 264.99(f).	PWGM-GWP pp. 203-205	
The Permit must specify the compliance period during which the ground-water protection standard applies. [40 CFR 264.96(b)]	The Permit Writer should specify the length of time in months or years, the facility is expected to be active and include the closure period. The post-closure period should be included for land disposal units that will not clean close.		

EVALUATION CRITERIA

Condition XI.D.: Sampling and Analysis Procedures

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify the procedures and techniques for sample collection under the compliance monitoring program [40 CFR 264.97(d) and (e)].	The specified procedures must be valid for the particular hazardous constituents monitored in the compliance monitoring program. In addition, sampling procedures must be specified for the annual Appendix IX sampling to determine the presence of any additional hazardous constituents. Sampling procedures established under Part 264 detection monitoring or interim status program may be applicable, but must be reviewed/modified to account for changes in the list of constituents to be tested. (See Section X. Detection Monitoring, Condition X.D for additional notes.)	PWGM-GWP pp. 83-109, 211-213	
	ENFORCEABILITY The Permit must include provisions to require that sampling and measurement during monitoring be representative as per 40 CFR 270.30(j)(1). The Permit must also include provisions for certification of monitoring results as per 40 CFR 270.30(k)(4) and inspection of monitoring activities as per 40 CFR 270.30(i)(3).		

Condition XI.E.: Elevation of the Ground-Water Surface

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
A determination of the ground-water surface elevation must be made each time the ground water is sampled. [40 CFR 264.97 (f)]	Recording the elevation of the ground-water surface is a critical factor in the monitoring program. The data is used to determine the amount of water to be evacuated from the well prior to sample collection, to draw potentiometric or water table maps and to ascertain if other factors are influencing the water table such as tidal effects, seasonal variations and off- or on-site well pumping. The Permittee should describe in the application the device and procedure to be used for measuring the elevation of the ground-water surface.	TEGD Chapter 4	

EVALUATION CRITERIA

Condition XI.F.: Statistical Procedures

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify the statistical procedures used to determine whether a statistically significant increase over concentration limits has occurred for each hazardous constituent monitored at the compliance point. [40 CFR 264.97(h)(1), 264.99(h)(2)]	The statistical procedure must be adequate to compare monitoring data with the established concentration limits to identify violations of the facility's ground-water protection standard. No basic procedures (e.g., Students' t-test) are specified in the regulations for compliance monitoring. The procedure chosen will be site specific and dependent on the nature of the concentration limits established in the Permit (background concentrations vs. specific concentration limits). Revisions to the 40 CFR Subpart F regulations will specify four performance standards that the statistical methods and sampling procedures must meet. Concentration limits based on background values require procedures to account for sampling/analysis variability as well as spatial and seasonal variability of background levels. **ENFORCEABILITY** The Permit must specify reporting requirements for compliance monitoring as per 40 CFR 264.99(f) and (i), and 40 CFR 270.31(c). The Permit must specify recordkeeping requirements as per 40 CFR 270.30(j). The Permit also must include provisions for certification of statistical results as per 40 CFR 270.30(k)(4).	PWGM-GWP pp. 127-154	

Condition XI.G.: Monitoring Program and Data Evaluation

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must require the determination of the concentration of hazardous constituents at least	The Permit Writer must require the monitoring wells be sampled for the hazardous constituents present at the facility at least quarterly during the compliance period. The Permit Writer may require more frequent sampling (e.g., if there is a high ground-water flow rate, the	PWGM-GWP pp. 211-213	

EVALUATION CRITERIA

Condition XI.G.: Monitoring Program and Data Evaluation (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
quarterly. [40 CFR 264.99(d)]	regulated unit is near ground-water users or sensitive environments, or the wastes are highly toxic).		
The Permit must require sampling for all Appendix IX 40 CFR 261 constituents. [40 CFR 264.99(f)]	The Permit Writer must require that Appendix IX constituents be analyzed for annually in all monitoring wells, but may require more frequent analysis.		

EVALUATION CRITERIA

Condition XII(A).B.: Well Location, Installation and Operation

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify a monitoring program as effective as that required for compliance monitoring. [40 CFR 264.100(d)]	For detailed requirements of monitoring well location, installation and operation, see X. Detection Monitoring, Condition X.B. Additional wells will generally be required for the adequate determination of ground-water elevations extent of the contamination, or the impact that corrective action is having on the quality of the ground water. Initially, monitoring wells may not have to be constructed as if they were to be used for compliance monitoring. Wells may be installed for the sole purpose of monitoring gross contamination or sampled when drilling.	PWGM-GWP pp. 15-81 255-260 TEGD Chapters 1-4	

Condition XII(A).C.: Ground-Water Protection Standard

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify concentration limits for each hazardous constituent included in the ground-water protection standard. [40 CFR 264.100(a)(1) and (2)]	The ground-water protection standard established for the compliance monitoring program is also applicable under a Subpart F corrective action program. For additional information, see XI. Compliance Monitoring, Condition XI.C. Ground-Water Protection Standard.	PWGM-GWP pp. 164-187	
The Permit must specify the monitoring constituents as part of the ground-water monitoring program which must be as effective as the compliance monitoring program. [40 CFR 264.100(d)]	The list of monitoring parameters and constituents should be developed from the Permittee's waste analysis plan, waste characterization, site hydro-geologic investigations, and the Appendix IX ground-water sample analyses. At the Permit Writer's discretion, a lengthier list of monitoring parameters and constituents at compliance point wells and a shorter list required for more distal wells may initially be required.	PWGM-GWP pp. 164-187 ACLG	

EVALUATION CRITERIA

Condition XII(A).C.: Ground-Water Protection Standard (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS
	ENFORCEABILITY The Permit must establish a ground-water protection standard which specifies concentration limits for each hazardous constituent to be monitored as per 40 CFR 264.94. The Permit must specify that whenever concentration limits are exceeded at the compliance point, or in ground water between the compliance point and the downgradient facility boundary, the owner/operator must institute a corrective action program under 40 CFR 264.100. The Permit must specify reporting requirements as effective as those for compliance monitoring under 40 CFR 264.99(f) and (i) and 40 CFR 270.31(c). The Permit must specify recordkeeping provisions as per 40 CFR 270.30(j), and certification of records as per 40 CFR 270.30(k)(4). The Permit also must reserve the Agency's right to sample or monitor at specified times to assure compliance as per 40 CFR 270.30(i)(4).

Condition XII(A).D.: Corrective Action Program

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit shall state when corrective action must begin. [40 CFR 264.100(c)]	Whenever the ground-water protection standard is exceeded, the owner or operator must develop and implement a corrective action program. The length of time granted to a facility prior to enacting a corrective action program may be dependent on the extent and type of contamination and the measures required to bring the facility back into compliance.	PWGM-GWP pp. 220-262	

EVALUATION CRITERIA

Condition XII(A) D.: Corrective Action Program (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify the specific measures to be taken to remove or treat in place any hazardous constituents from the ground water at the compliance point. [40 CFR 264.100(b)] The Permit must specify the specific measures to be taken to remove or treat in place any hazardous constituents from the ground water between the compliance point and the downgradient facility property boundary	The Permit Writer will need to carefully review the proposed corrective action plan to ensure it can accomplish the removal, or treatment in place, of hazardous constituents. A variety of methods are available for corrective action and the Permit Writer should be concerned that any system proposed meet the broad objectives of the corrective action program. The program may include containment measure to prevent further contaminant migration.		

Condition XII(A) E.: Sampling and Analysis Procedures

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify a monitoring program as effective as that required for compliance monitoring. [40 CFR 264.100(d)]	The requirements for ground-water monitoring at the compliance point must be at least as effective as those required for compliance monitoring pursuant to 40 CFR 264.97(d) and (e). Informational sampling may occur at some facilities in areas of gross contamination which requires less sophisticated sampling and analysis procedures. For more detailed information see X. Detection Monitoring, Condition X.D and IX. Compliance Monitoring, Condition XI.D.	PWGM-GWP pp. 253-259	

EVALUATION CRITERIA

Condition XII(A).E.: Sampling and Analysis Procedures (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	For monitoring wells located beyond the point of compliance, less sophisticated sampling procedures for key hazardous constituents may be specified for wells known to be grossly contaminated. As concentrations approach concentration limits, compliance point procedures must be applied. **ENFORCEABILITY** The Permit must include provisions to require that sampling and measurement during monitorin~ be representative pursuant to 40 CFR 270.30(j)(1). The Permit also must include provisions for certification of monitoring results pursuant to 40 CFR 270.30(k)(4) and inspection of monitoring activities pursuant to 40 CFR 270.30(l)(3).		

Condition XII(A).F.: Ground-Water Surface Elevation

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify a monitoring program as effective as that required for compliance monitoring. [40 CFR 264.100(d)]	To comply with the ground-water protection standard to determine if the corrective action program is effective, it is essential that the ground-water surface elevations be accurately measured at an adequate frequency. The corrective action measures may radically alter the ground-water flow direction, as may be indicated by the corrective action plan. It is important that the Permit Writer is aware of all changes effecting the ground-water flow-rate and direction.	PWGM-GWP pp. 253-259	

EVALUATION CRITERIA

Condition XII(A) G.: Statistical Procedures

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The Permit must specify statistical procedures to be followed in demonstrating that corrective action measures are effective and in determining compliance with the ground-water protection standard. [40 CFR 264.100(d)]	Statistical procedures to determine whether the facility has been brought back into compliance may generally follow the guidance given under XI. Compliance Monitoring Condition F: Statistical Procedure of this protocol. (Until ground-water quality improves to a concentration(s) near compliance, there generally is no need to perform this statistical analysis.) When a CAP is in place, statistical analysis must be specified to show that the CAP effectively is reclaiming the facility's ground water. Generally, a substantial data base must be generated before such statistical determinations are possible, especially where a large area beyond the compliance point is contaminated. Where it is found by the Permit Writer to be impractical to specify statistical measures to determine effectiveness, the following must be specified in the Permit: o A description of the water quality data base to be developed. o A deadline date for assessing the data to determine whether statistical measures to establish effectiveness may be instituted. **ENFORCEABILITY** The Permit must specify reporting requirements for corrective action program monitoring as per 40 CFR 264.99(f), 264.99(h)(2) and (i)(2), 264.100(g), and 40 CFR 270.31(c). The Permit must specify recordkeeping requirements as per 40 CFR 270.30(j). The Permit also must include provisions for certification of statistical results as per 40 CFR 270.30(k)(4).	PWGM-GWP pp. 127-155, 206-207, 260	

XII(B). CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS

EVALUATION CRITERIA

[This Part 4 is currently being revised and will be distributed when redrafted.]

EVALUATION CRITERIA

Condition XIII.C.2: Ground-Water Monitoring

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The post-closure permit must specify the monitoring and reporting requirements in accordance with the requirements of 40 CFR Subparts F, K, L, M and N [40 CFR 264.117(a)].	A post-closure permit may be issued to units which were regulated under RCRA interim status or a RCRA permit. For RCRA permitted units undergoing closure, all monitoring is performed to comply with the specifications in 40 CFR Subpart F. For RCRA interim status units which close without permits, ground-water monitoring activities during closure and post closure must continue to comply with the 40 CFR 265 Subpart F requirements. Upon issuance of a post-closure permit (either operating or post-closure) under 40 CFR 270.1(c), the closed unit is regulated by 40 CFR 264 requirements throughout the post-closure period. Interim status facility closure and post-closure plans should be reviewed for their compliance with the 40 CFR 264 Subpart F ground-water monitoring requirements. Review of existing ground-water monitoring data is required during closure activities to define appropriate post-closure ground-water monitoring programs and to ensure that closure design addresses all contaminant releases during the expected post-closure care period for the unit. For information on 40 CFR Subpart F ground-water monitoring requirements, see X. Detection Monitoring and XI. Compliance Monitoring.	PWGM TEGD	

EVALUATION CRITERIA

Condition XIII.C.3., 4., and/or 5.: Post-Closure Procedures

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
The permittee shall comply with the post-closure care requirements for surface impoundments, land treatment units and/or landfills (unit type, as appropriate) [40 CFR 264.228(b)(1) and (3); 40 CFR 264.280(c), and/or 40 CFR 264.310(b)]	The specific requirements for post-closure care vary by the type of unit. In establishing site-specific permit conditions, the permit writer must carefully review the permittee's proposed post-closure care procedures to ensure that the permittee fully understands his obligations for long-term care and that the proposed procedures, as described in the post-closure permit application, are sound and meet acceptable practices. One on the key elements for review is the proposed inspection schedule. The long-term site inspection schedule must ensure continued operation of equipment, site access controls and closure controls. Inspections should cover the following items: o security control devices; o erosion damage; o cover settlement, subsidence and displacement; o vegetative cover condition; o integrity of run-on and run-off control measures; o cover drainage system functioning; o leak detection system; o leachate collection and removal system; o gas venting system; o well condition; and o benchmark integrity.	SW-867 SW-873 SILS LDFC LTCPC	

EVALUATION CRITERIA

Condition XIII.C.3., 4., and/or 5.: Post-Closure Procedures (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS

In addition to the inspection schedule, the permittee must describe the specific procedures he will use to assess long-term care and performance of maintenance activities such as:

- repair of security control devices;
- erosion damage repair;
- correction of settlement, subsidence and displacement;
- mowing, fertilization and other vegetative cover maintenance;
- leachate removal system maintenance; and
- well replacement

Examples of procedures that should be covered are:

- Prevent erosion damage - The permittee must inspect the facility to identify cover areas that have eroded and replace the eroded material.

- Settlement and subsidence of caps - Caps are subject to settlement and subsidence due to foundation compression, waste compression, and settlement due to dewatering. The permittee must survey the cap elevations over time to monitor the extent of settlement. The permittee must establish surveying benchmarks at the site as reference points in order to conduct these surveys.

EVALUATION CRITERIA

Condition XIII.C.3., 4., and/or 5.: Post-Closure Procedures (cont'd)

REGULATORY REQUIREMENT	TECHNICAL SOUNDNESS	REFERENCES	FINDINGS/COMMENTS
	o Maintenance of vegetative covers - Roots from the vegetative cover must not penetrate the cover. The permittee must assure that items (such as heavy brush or trees) do not start growing on the vegetative cover. These items must be removed as soon as possible and an assessment made of potential damage from their roots.		

Note: This discussion may be expanded, pending the availability of EPA guidances and/or policies presenting specific procedures for post-closure activities.

LIST OF REFERENCES

ABBREVIATION	REFERENCE
General Facility Conditions	
PAGM-GFS	U.S. EPA. 1983. Permit Applicant's Guidance Manual for the General Facility Standards of Part 264.
PAGM-CLAEAR	U.S. EPA. 1984. Permit Writer's Guidance Manual for Hazardous Waste Land Storage and Disposal Facilities - Criteria for Location Acceptability and Existing Applicable Regulations.
PAGM	U.S. EPA. 1984. Permit Applicant's Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal. EPA/530 SW-84-004.
Containers	
PWGD-Containers	U.S. EPA. 1982. Draft Guidance for Permit Writers - Facilities Storing Hazardous Waste in Containers. U.S. EPA, Office of Solid Waste. Washington, D.C.
STHWT	U.S. EPA. 1986. Technical Resource Document: Storage and Treatment of Hazardous Wastes in Tank Systems. EPA/530-SW-86-044
Waste Piles	
WPDLS	U.S. EPA. 1982. Draft RCRA Guidance Document: Waste Pile Design.
GSLS	U.S. EPA. 1987. Draft Minimum Technology Guidance on Single Liner Systems for Landfills, Surface Impoundments, and Waste Piles. EPA/530-SW-85-0137.
Liner Systems	
PWGM	U.S. EPA. 1983. Permit Writer's Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities.

LIST OF REFERENCES

ABBREVIATION	REFERENCE
Liner Systems (cont'd)	
SW-846	U.S. EPA. 1986. Test Methods for Evaluating Solid Waste - Physical and Chemical Methods. SW-846.
NSF9	National Sanitation Foundation. 1983. Standard 54: Flexible Membrane Liners.
SW-870	U.S. EPA. 1983. Lining of Waste Impoundment and Disposal Facilities. SW-870.
SW-869	U.S. EPA. 1983. Landfill and Surface Impoundment Performance Evaluation. SW-869.
SW-84-001	U.S. EPA. 1984. Procedures for Modeling Flow Through Clay Liners to Determine Required Thickness. EPA/530-SW-84-001.
SW-925	U.S. EPA. 1984. Soil Properties, Classification, and Hydraulic Conductivity Testing. SW-925.
GDLS	U.S. EPA. 1984. Draft Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments--Design, Construction, and Operation.
Surface Impoundments	
PWGM	U.S. EPA. 1983. Permit Writers' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities.
PAGM	U.S. EPA. 1984. Permit Applicants' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal. EPA/530 SW-84-004.
HSWA	Hazardous and Solid Waste Amendments of 1984.
Liner Memo	McGraw, Jack. 1985. Draft Guidance Memorandum - Implementation of Minimum Technology Requirements of HSWA of 1984, Respecting Liners and Leachate Collection Systems.
GDLS	U.S. EPA. 1987. Draft Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments--Design, Construction, and Operation. EPA/530-SW-85-014.

LIST OF REFERENCES

ABBREVIATION	REFERENCE
Surface Impoundments (cont'd)	
SW-846	U.S. EPA. 1986. Test Methods for Evaluating Solid Waste - Physical and Chemical Methods. SW-846.
NSF	National Sanitation Foundation. 1983. Standard 54: Flexible Membrane Liners.
SW-870	U.S. EPA. 1983. Lining of Waste Impoundment and Disposal Facilities. SW-870.
SW-869	U.S. EPA. 1983. Landfill and Surface Impoundment Performance Evaluation. SW-869.
SW-84-001	U.S. EPA. 1984. Procedures for Modeling Flow Through Clay Liners to Determine Required Thickness. EPA/530-SW-84-001.
SW-925	U.S. EPA. 1984. Soil Properties, Classification, and Hydraulic Conductivity Testing. SW-925.
ISSIRV	U.S. EPA. 1986. Interim Status Surface Impoundments Retrofitting Variances. Final.
CQA	U.S. EPA. 1986. Technical Guidance Document: Construction Quality Assurance for Hazardous Waste Land Disposal Facilities. EPA/530-SW-86-031.
GSLS	U.S. EPA. 1987. Draft Minimum Technology Guidance on Single Liner Systems for Landfills, Surface Impoundments and Waste Piles. EPA/530-SW-85-013.
CLWMF	U.S. EPA. 1986. Draft Technical Resource Document for Public Comment - Design, Construction and Evaluation of Clay Liners for Waste Management Facilities. March. EPA/530-SW-86-007.
Landfills	
HSWA	Hazardous and Solid Waste Amendments of 1984.
Liner Memo	McGraw, Jack. 1985. Draft Guidance Memorandum - Implementation of Minimum Technology Requirements of HSWA of 1984, Respecting Liners and Leachate Collection Systems.

LIST OF REFERENCES

ABBREVIATION	REFERENCE
Landfills (cont'd)	
PWGM	U.S. EPA. 1983. Permit Writers' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities.
GDLS	U.S. EPA. 1987. Draft Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments--Design, Construction, and Operation.
CQA	U.S. EPA. 1986. Construction Quality Assurance for Hazardous Waste Land Disposal Facilities. EPA/530-SW-86-031.
BLHW	U.S. EPA. 1986. Prohibition on the Disposal of Bulk Liquid Hazardous Wastes in Landfills. Statutory Interpretive Guidance. June 11. EPA/530-SW-86-016.
SW-846	U.S. EPA. 1986. Test Methods for Evaluating Solid Waste - Physical and Chemical Methods. SW-846.
NSF	National Sanitation Foundation, 1983. Standard 54: Flexible Membrane Liners.
SW-870	U.S. EPA. 1983. Lining of Waste Impoundment and Disposal Facilities. SW-870.
SW-869	U.S. EPA. 1983. Landfill and Surface Impoundment Performance Evaluation. SW-869.
SW-84-001	U.S. EPA. 1984. Procedures for Modeling Flow Through Clay Liners to Determine Required Thickness. EPA/530-SW-84-001.
SW-925	U.S. EPA. 1984. Soil Properties, Classification, and Hydraulic Conductivity Testing. SW-925.
PAGM	U.S. EPA. 1984. Permit Applicants' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal. EPA/530-84-004.
LDFC	U.S. EPA. 1982. Draft RCRA Guidance Document - Landfill Design. Liner System and Final Cover.
SW-867	U.S. EPA. 1982. Evaluating Cover Systems for Solid and Hazardous Wastes. SW-867.

LIST OF REFERENCES

ABBREVIATION	REFERENCE
Landfills (cont'd)	
PNHL	U.S. EPA. 1986. Restrictions on the Placement of Non-Hazardous Liquids in Hazardous Waste Landfills. April 30.
CLWMF	U.S. EPA. 1986. Draft Technical Resource Document for Public Comment - Design, Construction and Evaluation of Clay Liners for Waste Management Facilities. March. EPA/530-SW-86-007.
Land Treatment	
PGM-HWLTD	U.S. EPA. 1986. Permit Guidance Manual on Hazardous Waste Land Treatment Demonstrations. EPA/530-SW-86.
PGM/UZM-HWLT	U.S. EPA. 1986. Permit Guidance Manual on Unsaturated Zone Monitoring for Hazardous Waste Land Treatment Units. EPA/530-SW-86-040
HWLT	U.S. EPA. 1983. Hazardous Waste Land Treatment. SW-874.
PAGM	U.S. EPA. 1984. Permit Applicants' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal. EPA/530 SW-84-004.
Incineration	
GM-HWIP	U.S. EPA. 1983. Guidance Manual for Hazardous Waste Incinerator Permits.
EH-HWI	U.S. EPA. 1980. Engineering Handbook for Hazardous Waste Incineration.
FR-86-119/ESD	U.S. EPA. 1987. Guidance on Trial Burn Reporting and Setting Permit Conditions (Draft Final)
Ground-Water Monitoring	
PWGM-GWP	U.S. EPA. 1983. Permit Writers' Guidance Manual for Part 264, Subpart F Ground-water Protection.
MGWSP	U.S. EPA. 1981. Manual of Ground-water Quality Sampling Procedures.

LIST OF REFERENCES

ABBREVIATION	REFERENCE
Ground-Water Monitoring (cont'd)	
ACLG	U.S. EPA. 1985. Alternate Concentration Limit Guidance Based on §264.94(b) Criteria. Part I. Information Required in ACL Demonstrations.
TEGD	U.S. EPA. 1986. RCRA Groundwater Monitoring Technical Enforcement Guidance Document.
GWMIM	U.S. EPA. 1987. RCRA Groundwater Monitoring Operation and Maintenance Inspections Guidance Manual.
CIVH	Criteria For Identifying Areas of Vulnerable Hydrogeology Under RCRA Guidance Manual and Appendices.
Post-Closure Care	
SW-867	U.S. EPA. 1982. Evaluating Cover Systems for Solid and Hazardous Wastes.
SW-873	U.S. EPA. 1982. Closure of Hazardous Waste Surface Impoundments.
SILS	U.S. EPA. 1982. Draft RCRA Guidance Document: Surface Impoundment Liner Systems, Final Cover and Freeboard Control.
LDFC	U.S. EPA. 1982. Draft RCRA Guidance Document: Landfill Design - Liner Systems and Final Cover
LTCPC	U.S. EPA. 1987. Part 265 Land Treatment Closure/ Post-Closure Guidance. OSWER Directive No. 9476.00-9

APPENDIX A

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS

Facility Name _____
ID No. _____

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
I	STANDARD CONDITIONS			
A	Effect of Permit [§§270.4, 270.30(g)]			
B	Permit Actions [§270.30(f)]			
C	Severability [§124.16(a)]			
D	Duties and Requirements			
D-1	Duty to comply [§270.30(a)]			
D-2	Duty to reapply [§§270.30(b), 270.10(h)]			
D-3	Permit expiration [§270.51]			
D-4	Need to halt or reduce activity not a defense [§270.30(c)]			
D-5	Duty to mitigate [§270.30(d)]			
D-6	Proper operation and maintenance [§270.30(e)]			
D-7	Duty to provide information [§§270.30(h), 264.74(a)]			
D-8	Inspection and entry [§270.30(i)]			
D-9	Monitoring and records [§§270.30(j), 270.30(i)(4)]			
D-10	Reporting planned changes [§270.30(l)(1)]			
D-11	Certification of construction or modification [§270.30(l)(2)(i)]			
D-12	Anticipated noncompliance [§270.30(l)(2)]			
D-13	Transfer of permits [§§270.30(l)(3), 270.40]			

Note: Under the provisions of 40 CFR 270.65, R,D&D permits may be issued for a period up to one year. The Administrator may waive permit requirements, except those regarding financial responsibility and those related to public participation. Thus, the reviewer may expect to see a great deal of variation in R,D&D permits. If there are hazardous waste storage facilities associated with the experimental process units, they must be permitted in accordance with the requirements of 40 CFR Parts 270 and 264. Those permit conditions may be evaluated using Sections I through IV of the Permit Quality Protocol.

Facility Name _____
ID No. _____

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
D-14	Compliance schedules [§270.30(l)(5)]			
D-15	Twenty-four hour reporting [§§270.30(l)(6), 264.56(d) and (j)]			
D-16	Manifest discrepancy reports and unmanifested waste reports [§270.30(l)(7) and (8)]			
D-17	Biennial report [§270.30(l)(9)]			
D-18	Other noncompliance [§270.30(l)(10)]			
D-19	Other information [§270.30(l)(11)]			
E	Signatory Requirements [§§270.11, 270.30(k)]			
F	Confidential Information [§270.12]			
G	Documents to be Submitted Prior to Operation [§§270.32, 270.33]			
H	Documents to be Maintained at Facility Site			
H-1	Waste analysis plan [§264.13(b)]			
H-2	Personnel training documents/records [§264.16(d)]			
H-3	Contingency plan [264.53(a)]			
H-4	Closure plan/post-closure plan [§264.112(a)]			
H-5	Closure cost estimate/post-closure cost estimate [§264.142(d)]			
H-6	Operating record [§264.73]			
H-7	Inspection schedule(s) [§264.15(b)]			
H-8	Other documents			

Facility Name _____
ID No. _____

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
II	GENERAL FACILITY CONDITIONS			
A	Design and Operation of Facility [§264.31]			
B	Required Notices [§264.12]			
C	General Waste Analysis [§264.13]			
C-1	Parameters to be analyzed for in each waste [§264.13(b)(1)]			
C-2	Analytical methods [§264.13(b)(2)]			
C-3	Methods to sample wastes [§264.13(b)(3)]			
C-4	Frequency of analysis [§264.13(b)(4)]			
C-5	Wastes from off-site [§264.13(a)(4) and (b)(5)]			
C-6	Waste characterization requirements for specific types of treatment and disposal [§264.13(b)(6)]			
D	Security [§264.14]			
D-1	Description of barrier and means to control entry (or 24-hour surveillance system) [§264.14(b)]			
D-2	Description of warning signs [§264.14(c)]			
E	General Inspection Requirements* [§264.15]			
E-1	Inspection schedule [§264.15(b)]			
F-2	Items to be inspected [§264.15(b)(1)]			
E-3	Type of problems for which each item is inspected [§264.15(b)(3)]			
E-4	Inspection frequency [§264.15(b)(4)]			
F	Personnel Training [§264.16]			
F-1	Program director [§264.16(a)(2)]			
F-2	Training program contents [§264.16(a)(3)]			

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CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
F-3	Frequency of training [§264.16(b) and (c)]	____	_____	_____
G	General Requirements for Ignitable, Reactive, or Incompatible Waste [§264.17]			
G-1	Ignitable or reactive [§264.17(a)]	____	_____	_____
G-2	Incompatibles [§264.17(b)]	____	_____	_____
H	Location Standards [§§264.18, 270.14(b)(11)]			
H-1	Seismic considerations [§264.18(a)]	____	_____	_____
H-2	Flood proofing description/drawings [§264.18(b)]	____	_____	_____
H-3	Flood plan [§264.18(b)]	____	_____	_____
I	Preparedness and Prevention			
I-1	Required equipment [§264.32]	____	_____	_____
I-2	Testing and maintenance of equipment [§264.33]	____	_____	_____
I-3	Access to communications or alarm system [§264.34]	____	_____	_____
I-4	Required aisle space [§264.35]	____	_____	_____
I-5	Arrangements with local authorities [§264.37]	____	_____	_____
J	Contingency Plan			
J-1	Implementation of plan [§264.51]	____	_____	_____
J-2	Copies of plan [§264.53]	____	_____	_____
J-3	Amendments to plan [§264.54]	____	_____	_____
J-4	Contents of contingency plan [§264.52]	____	_____	_____
J-4a	response procedures [§264.52(a)]	____	_____	_____
J-4b	coordination agreements [§264.52(c)]	____	_____	_____
J-4c	emergency coordinators [§§264.52(d), 264.55]	____	_____	_____
J-4d	emergency equipment [§264.52(e)]	____	_____	_____

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CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
J-4e	evacuation plan [§264.52(f)]			
J-5	Emergency procedures [§264.56]			
J-5a	notification [§264.56(a)]			
J-5b	identification of hazardous materials [§264.56(b)]			
J-5c	assessment of hazards [§264.56(c)]			
J-5d	notification in event of threat to human health or the environment [§264.56(d)]			
J-5e	prevention of recurrence or spread of fires, explosions, or releases [§264.56(e)]			
J-5f	monitoring following cessation of operations [§264.56(f)]			
J-5g	storage and treatment of released materials [§264.56(g)]			
J-5h	incompatible wastes [§264.56(h)(1)]			
J-5i	post-emergency equipment maintenance [§264.56(h)(2)]			
J-5j	notification and reports [§264.56(i) and (j)]			
J-6	Unit-specific control procedures			
K	Manifest System [§§264.71, 264.72]			
L	Recordkeeping and Reporting			
L-1	Operating record [§264.73]			
L-2	Availability of records [§264.74]			
L-3	Biennial report [§264.75]			
L-4	Unmanifested waste report [§264.76]			

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CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
M	General Closure Requirements*			
M-1	Requirement for written plan [§264.112(a)]	____	_____	_____
M-2	Content of closure plan [§264.112(b)]	____	_____	_____
M-2a	description of final closure [§264.112(b)(2)]	____	_____	_____
M-2b	maximum waste inventory [§264.112(b)(3)]	____	_____	_____
M-2c	decontamination or removal procedures [§§264.112(b)(4), 264.114]	____	_____	_____
M-2d	other activities required to meet closure standard [§264.112(b)(5)]	____	_____	_____
M-2e	closure schedule [§§264.112(b)(6), 264.113]	____	_____	_____
M-2f	estimated year of final closure (where applicable) [§264.112(b)(7)	____	_____	_____
M-3	Amendment of plan [§264.112(c)]	____	_____	_____
M-4	Notification of partial closure and final closure [§264.112(d)]	____	_____	_____
M-5	Removal of wastes and decontamination or dismantling of equipment [§264.112(e)]	____	_____	_____
M-6	Certification of closure [§264.115]	____	_____	_____
N	Cost Estimate for Facility Closure [§§264.142]	____	_____	_____
O	Financial Assurance for Facility Closure [§§264.143, 264.145]	____	_____	_____
P	Liability Requirements [§264.147]	____	_____	_____
Q	Incapacity of Owners or Operators, Guarantors, or Financial Institutions [§264.148]	____	_____	_____

*The general closure requirements applicable to all types of hazardous waste management units are listed under item M. The specific technical requirements applicable to each type of unit are listed under those units.

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CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
III	DESIGN AND OPERATING CONDITIONS			
A	Process Description			
A-1	Unit processes (including treatment chemicals)			
A-2	Process flow			
B	Design and Construction of Process Units			
B-1	Design plans and specifications			
B-1a	process units			
B-1b	pollution control equipment			
B-2	Materials of construction			
B-3	Construction procedures and specifications (for new units)			
B-4	Construction monitoring and inspection			
C	Operations			
C-1	Wastes			
C-1a	allowable types and quantities of wastes			
C-1b	waste feed rates			
C-1c	sources of wastes (where applicable)			
C-1d	specific prohibitions or exclusions			
C-2	Operating limits			
C-2a	operating limits (e.g., flow rates, temperature, pressure)			
C-2b	chemical feed rates			
C-2c	retention times, mixing rates, etc.			
C-3	Operating procedures			
C-4	Operating controls			

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CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
C-4a	monitoring and instrumentation			
C-4b	process controls (valves, etc.)			
C-5	Procedures for treating and disposing of by-products or off-spec product			
C-6	Process monitoring and reporting (to evaluate efficacy of the process)			
C-6a	parameters to be monitored			
C-6b	monitoring and sampling methods and instrumentation			
C-6c	analytical methods (where appropriate)			
C-6d	required form of data			
C-6e	statistical procedures (where appropriate)			
C-6f	recordkeeping requirements (related to process efficiency)			
C-6g	reporting requirements (related to process efficiency)			